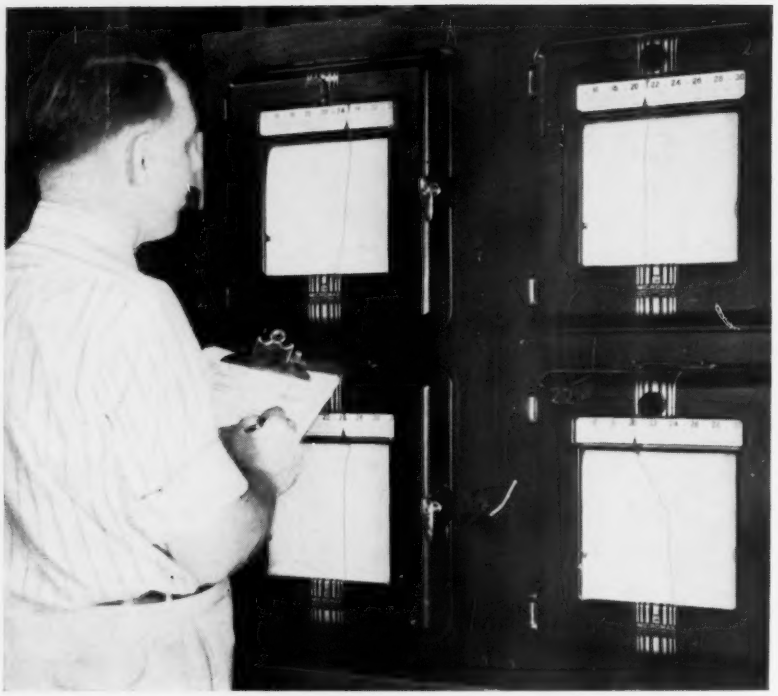
CERAMIC ABSTRACTS and THE BULLETIN

OF THE

AMERICAN CERAMIC SOCIETY

MARCH 15, 1943

MONTHLY PUBLICATION DEVOTED TO THE ARTS AND SCIENCES RELATED TO THE SILICATE INDUSTRIES



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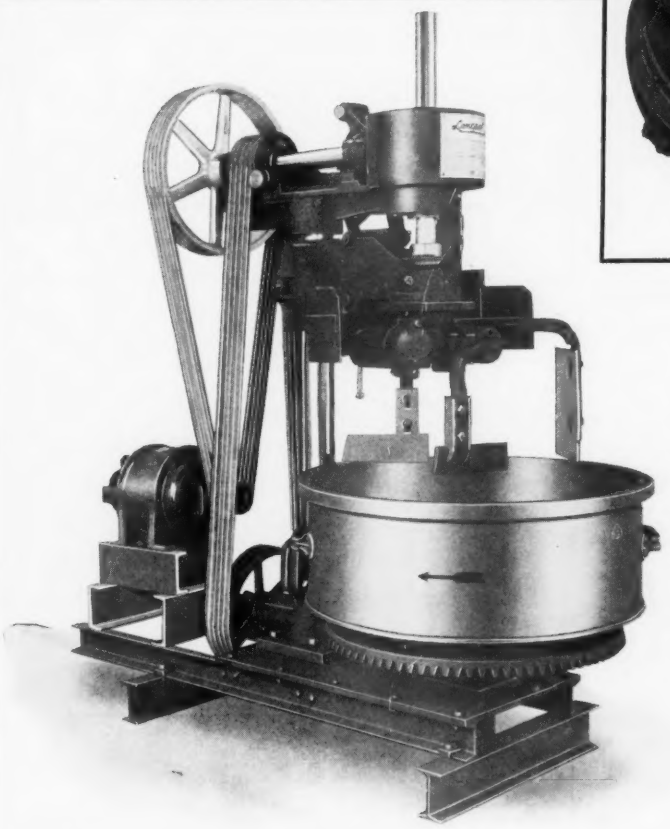

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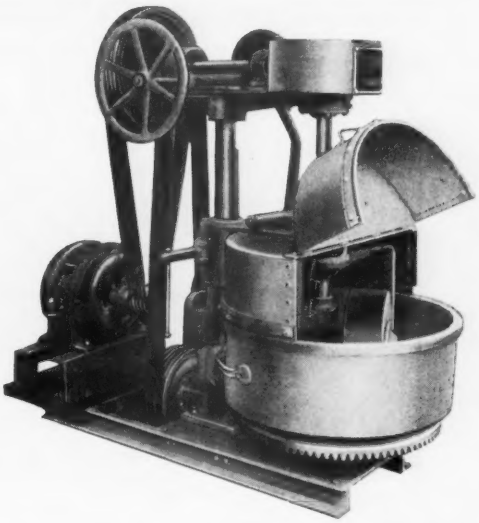

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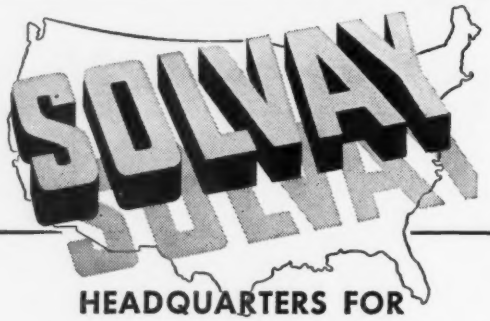

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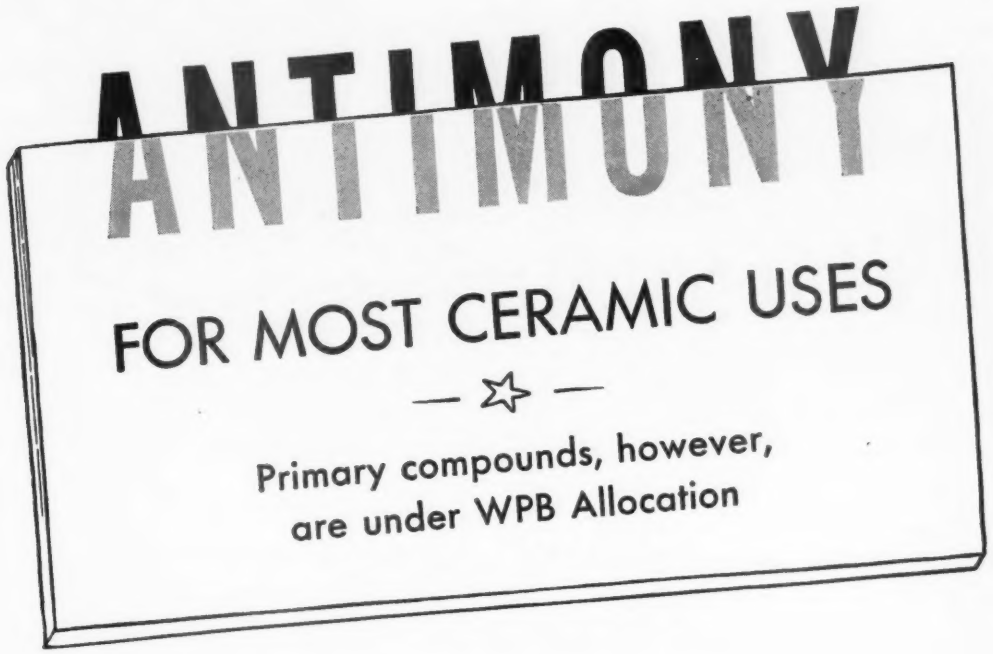

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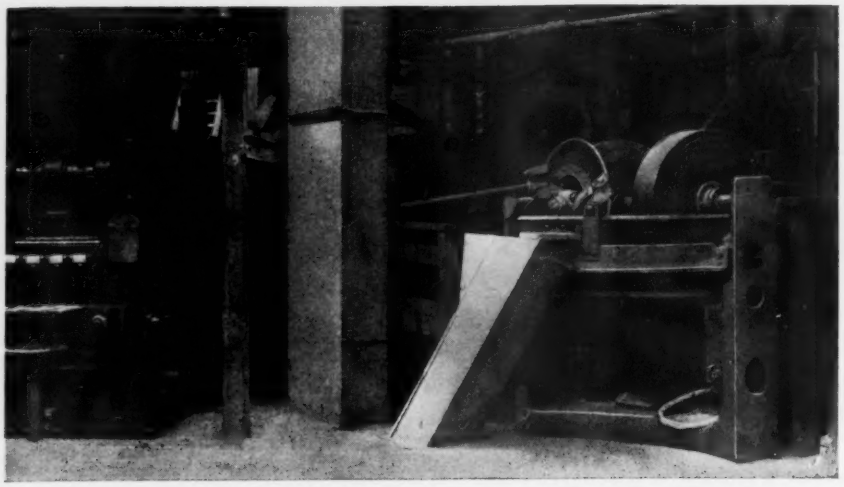

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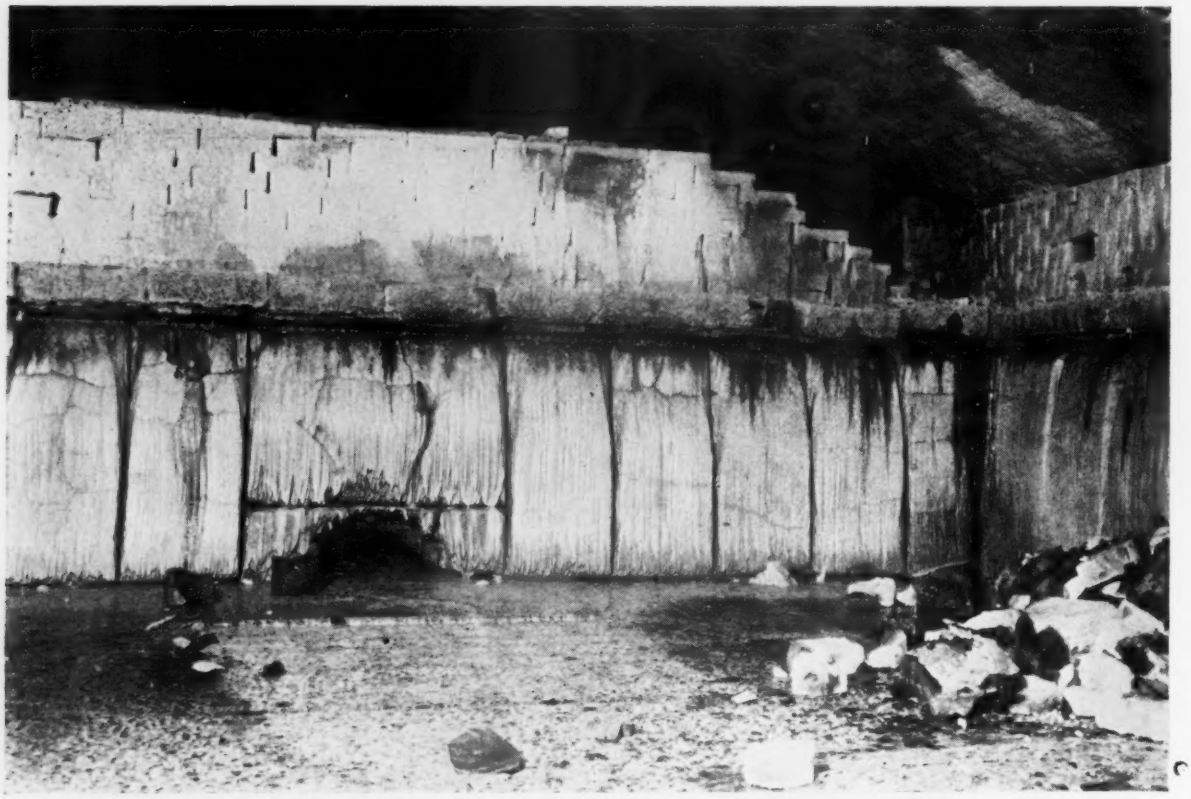

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Compiled by

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Vol. 22 **March 15, 1943** **No. 3**

Abrasives

Grinding wheel cost control. JEFF. ALAN WESTOVER. *Trans. Amer. Foundrymen's Assn.*, **50** [2] 595–610 (1942).—W. deals with conclusions obtained from a cost reduction and control program on grinding wheels and discusses methods being developed by the manufacturer to insure the constancy of a grade of grinding wheel selected, describing future methods of selection. He stresses operating conditions as the greatest factor affecting grinding-wheel costs and discusses control factors, such as the condition of the equipment, the condition in which the castings reach the grinder, the grade of grinding wheel, and control of the operator. Operator control is the most important factor, and a wage incentive payment plan to establish and maintain such control is presented. Tables and figures are given covering studies of individual methods of work and their effect on grinding-wheel costs, as well as standards used in figuring wage payment. H.E.S.

Grinding wheels. ANON. *Rev. Sci. Instruments*, **13** [10] 467 (1942).—A new type of precision grinding wheel called "Por-os-way," manufactured by A. P. DeSanno & Son, Inc., Phoenixville, Pa., removes stock 100 to 400% faster than ordinary wheels. The fast cut grinding is attributed to the uniform and "spongy" but coherent structure. H.E.S.

PATENTS

Abrading machine. H. L. IMELMANN (Permo Products Corp.). U. S. 2,307,407, Jan. 5, 1943 (May 7, 1941).

Abrading wheel. E. I. WHITING (Draper Corp.). U. S. 2,307,312, Jan. 5, 1943 (Sept. 4, 1941).

Abrasive article. C. E. BARNES (Norton Co.). U. S. 2,308,854, Jan. 19, 1943 (Aug. 25, 1941). J. P. FENTON (American Sandpaper Co.). U. S. 2,309,836, Feb. 2, 1943 (Nov. 26, 1941).

Abrasive article. E. P. DAHLSTROM AND EDGAR HORNE (Carborundum Co.). U. S. 2,309,305, Jan. 26, 1943 (March 10, 1941).—The method of making endless abrasive belts.

Abrasive article. W. S. HOSKIN AND F. B. WOLFSCHLAGER (Mid-West Abrasive Co.). U. S. 2,309,456, Jan. 26, 1943 (Feb. 16, 1942).—An abrasive tool comprising a hollow core of two oppositely wound helical rubber strips and a cover of a helically wound flexible abrasive strip.

Abrasive article comprising a bond having a filler therein. S. S. KISTLER (Norton Co.). U. S. 2,308,982, Jan. 19, 1943 (Feb. 4, 1942).—An abrasive article comprising abrasive grains, a bond uniting the grains as an integral body, and a filler comprising potassium calcium sulfate interspersed throughout the bonded mass.

Abrasive article and method of making. R. H. LOMBARD AND L. H. MILLIGAN (Norton Co.). U. S. 2,309,463, Jan. 26, 1943 (Nov. 23, 1935).—The method of bonding diamond granules to form a vitrified abrasive article which comprises mixing the diamonds with a ceramic material and firing at about 1000 °C. or below in an atmosphere of carbon monoxide.

Abrasive articles. S. S. KISTLER (Norton Co.). U. S. 2,308,981, Jan. 19, 1943 (Feb. 4, 1942).—An abrasive article comprising abrasive grains, a bond uniting the grains as an integral body, and iron sulfide interspersed throughout the bonded mass.

Abrasive belt or sheet. B. J. OAKES (Minnesota Mining & Mfg. Co.). Can. 408,875, Nov. 24, 1942 (Aug. 19, 1940). G.M.H.

Abrasive grains. NORTON GRINDING WHEEL CO., LTD. Brit. 549,715, Dec. 16, 1942 (June 26, 1940).

Abrasive metal carbide producing apparatus. R. R. RIDGWAY (Norton Co.). Can. 408,575, Nov. 10, 1942 (Nov. 20, 1941; in U. S. Nov. 23, 1940). G.M.H.

Apparatus for forming or dressing the operative faces of grinding wheels. S. J. HARLEY AND J. E. WAINWRIGHT. U. S. 2,309,312, Jan. 26, 1943 (Jan. 6, 1941).

Apparatus for grinding billets or slabs. B. A. WILSON. U. S. 2,308,842, Jan. 19, 1943 (Jan. 21, 1941).

Apparatus for lapping and polishing operations. F. F. HILLIX (American Steel & Wire Co. of New Jersey). U. S. 2,309,588, Jan. 26, 1943 (May 18, 1938).

Article of resin-bonded abrasive grains. C. E. BARNES (Norton Co.). U. S. 2,308,853, Jan. 19, 1943 (Aug. 25, 1941).—An abrasive article comprising abrasive grains united by a bond composed primarily of a resin formed of copolymerized substances comprising an ester of an alkyl

alcohol having not over 4 carbon atoms per mol. and an acid selected from the group consisting of the acrylic, chloracrylic, and methacrylic acids copolymerized with an ester selected from the group consisting of the vinyl and isopropenyl esters of one of the acids.

Bonded abrasive articles containing fillers. S. S. KISTLER (Norton Co.). U. S. 2,308,983, Jan. 19, 1943 (April 15, 1942).—An abrasive article comprising abrasive grains, a bond uniting the grains as an integral body, and alkali metal fluoborate interspersed throughout the bonded mass.

Buffing wheel. V. J. TWYNING, F. G. CYREX, AND A. H. LOSEY (J. C. Miller Co.). U. S. 2,309,553, Jan. 26, 1943 (Feb. 24, 1941).

Centerless grinder. G. W. BINNS (Cincinnati Grinders, Inc.). U. S. 2,308,739, Jan. 19, 1943 (Dec. 15, 1941).

Coated abrasive. N. E. OGLESBY (Behr-Manning Corp.). U. S. 2,307,232, Jan. 5, 1943 (July 16, 1936).

Coated abrasive web manufacture. R. L. MELTON (Carborundum Co.). Can. 407,976, Oct. 13, 1942 (Jan. 31, 1942). G.M.H.

Composite grinding wheel. F. M. RYAN (Norton Co.). U. S. 2,309,016, Jan. 19, 1943 (Feb. 9, 1942).

Contour grinder tool. F. L. LE BUS. U. S. 2,308,182, Jan. 12, 1943 (March 13, 1942).

Crankshaft grinder. JOSEPH SUNNEN (Cornelia Sunnen). U. S. 2,309,615, Jan. 26, 1943 (May 22, 1939; Dec. 29, 1939).

Grinding jig. J. Y. BLAZEK, G. E. SEARS, AND V. R. ROY (Lempco Products, Inc.). U. S. 2,309,620, Feb. 2, 1943 (Aug. 23, 1940).

Grinding machine. P. R. HOFFMAN (G. C. Hunt). U. S. 2,308,512, Jan. 19, 1943 (Dec. 6, 1941).—A lapping machine. J. E. POORMAN. U. S. 2,309,668, Feb. 2, 1943 (Nov. 10, 1941).

Grinding machine. J. E. POORMAN. U. S. 2,309,669, Feb. 2, 1943 (Nov. 13, 1941).—In a grinding apparatus, a material-supporting table, power means for operating the table in both directions, a stop for stopping table movement, reversing mechanism for the power means, and an element of the power means for operating the table mounted for independent movement with respect to the table after the table is stopped for actuating the reversing mechanism.

Grinding or shaping machines. BUDD INDUCTION HEATING, INC. Brit. 548,929, Nov. 11, 1942 (July 31, 1940); addition to Brit. 540,091, Oct. 15, 1941 (April 8, 1939).

Grinding tool speed reducer. J. Y. BLAZEK AND G. E. SEARS (Lempco Products, Inc.). U. S. 2,308,352, Jan. 12, 1943 (March 11, 1940).

Grinding wheel. LORING COES, JR. (Norton Co.). U. S. 2,309,575, Jan. 26, 1943 (June 4, 1942).—The method of making abrasive articles comprising wetting a quantity of abrasive grain with monomeric polyglycol dichloride selected from the group consisting of di-, tri-, tetra-, and penta-glycol dichlorides, stirring into the wet abrasive grain a quantity of resin comprising the condensate in the presence of a strong acid of formaldehyde and primary aromatic amine selected from the group consisting of aniline, ortho-, meta-, and para-toluidine, and diamino diphenyl methane, thus producing a plastic moldable dry granular mix, spreading the dry granular mix in a mold, pressing, and curing at resin-curing temperature.

Grinding wheel. EDWARD VAN DER PYL (Norton Co.). Can. 407,711, Sept. 29, 1942 (March 17, 1941; in U. S. Dec. 24, 1940). Can. 407,712, Sept. 29, 1942 (April 12, 1941; in U. S. June 5, 1940). G.M.H.

Grinding-wheel dresser. JOHN SNEED (W. F. Dalzen). U. S. 2,308,317, Jan. 12, 1943 (May 12, 1941).

Grinding-wheel mount. B. A. WILSON. U. S. 2,308,843, Jan. 19, 1943 (Sept. 20, 1941).

Grinding-wheel mounting and control. BRYANT CHUCKING GRINDER CO. Brit. 548,870, Nov. 11, 1942 (April 23, 1940).

Lapping machine. H. S. INDGE (Norton Co.). U. S. 2,308,976, Jan. 19, 1943 (July 4, 1942). NORTON CO. Brit. 549,423, Dec. 2, 1942 (Oct. 5, 1940). W. S. PRAEG (National Broach & Machine Co.). U. S. 2,307,637, Jan. 5, 1943 (Aug. 1, 1941).

Lapping tool. D. A. WALLACE (Chrysler Corp.). U. S. 2,309,485, Jan. 26, 1943 (July 17, 1940).

Lens facet grinding machine. A. L. ANDERSON (Cosmet Corp.). Can. 407,844, Oct. 6, 1942 (Jan. 8, 1941). G.M.H.

Liner for bearings for polishing wheels, etc. DANIEL BRAXTON. U. S. 2,307,386, Jan. 5, 1943 (June 27, 1942).

Liner for polishing wheels, grindstones, etc. DANIEL BRAXTON. U. S. 2,307,385, Jan. 5, 1943 (Feb. 5, 1942).

Machine and method for grinding gears, splines, etc. W. F. ROSS. U. S. 2,307,238, Jan. 5, 1943 (Oct. 30, 1939). Brit. 548,863, Nov. 11, 1942 (Oct. 30, 1939).

Machine tool. M. I. MATHEWSON (Brown & Sharpe Mfg. Co.). U. S. 2,308,531, Jan. 19, 1943 (Aug. 3, 1940).

Manufacture of abrasive articles. R. L. MELTON, A. L. BALL, AND R. C. BENNER (Carborundum Co.). U. S. 2,307,698, Jan. 5, 1943 (May 20, 1942).—A method of making flexible, fibrous abrasive web material.

Means for producing or forming the peripheral profile of a grinding wheel. A. SCRIVENER, LTD., AND A. SCRIVENER. Brit. 548,985, Nov. 11, 1942 (Aug. 20, 1941).

Relief-grinding cutters. ERNEST WILDHABER (Gleason Works). U. S. 2,308,734, Jan. 19, 1943 (April 12, 1941).

Rubber-bonded abrasive article. R. H. MARTIN (Norton Co.). Can. 408,574, Nov. 10, 1942 (Jan. 17, 1941; in U. S. Jan. 22, 1940). G.M.H.

Segmental abrasive grinding wheel for pulpwood. L. A. PATT (Carborundum Co.). Can. 407,975, Oct. 13, 1942 (Dec. 7, 1940; in U. S. Dec. 14, 1939). G.M.H.

Segmental grinding wheel. P. E. MEYER (Cortland Grinding Wheels Corp.). U. S. 2,307,632, Jan. 5, 1943 (Feb. 27, 1942).

Sheeted abrasive. D. O. GUTH (Minnesota Mining & Mfg. Co.). U. S. 2,307,461, Jan. 5, 1943 (May 2, 1928; renewed April 19, 1939).

Surface grinding machines. NORTON CO. Brit. 549,657, Dec. 16, 1942 (Oct. 18, 1940).

Universal radius truing fixture for grinding machines. R. E. ROOT (C. E. Walling). U. S. 2,309,924, Feb. 2, 1943 (March 29, 1941).

Valve seat grinding device. J. A. SMITH II (U. S. Electrical Tool Co.). U. S. 2,308,472, Jan. 12, 1943 (Feb. 24, 1941).

Waterproof abrasive block and method of producing. L. A. HATCH (Minnesota Mining & Mfg. Co.). U. S. 2,309,108, Jan. 26, 1943 (Jan. 2, 1930; Feb. 13, 1937).

Work holder for grinding machines. G. C. HUNT. U. S. 2,309,080, Jan. 19, 1943 (Dec. 6, 1941).

Art and Archeology

Irving Wightman Colburn. WILLIAM P. CLARKE. *Bull. Amer. Ceram. Soc.*, **22** [2] 31–34 (1943).

Community goes ceramic. HENRY E. MARLEY. *Bull. Amer. Ceram. Soc.*, **22** [2] 39–40 (1943).

Educational aspects of ceramic art. J. SHELDON CAREY. *Bull. Amer. Ceram. Soc.*, **22** [2] 35–37 (1943).

Handwork and the machine in ceramics. GÜNTHER F. V. PECHMANN. *Keram. Rundschau*, **46** [45] 525–26 (1938).—Men who have never known the machine but who have done all handwork live differently from machine workers. Handwork keeps man closer to nature. Ceramic ware, especially artware, can almost be called a piece of nature, as it requires the four elements believed fundamental by the ancients: it is formed of Earth and Water, dried in Air, and burned in Fire. Because of the ease with which clay is fashioned and the great durability of ceramic products, the traits of a race, a period, or a culture are expressed and preserved for posterity in the works of the potter and the brickmaker; 95% of all prehistoric documents are written on fired clay. With

the coming of the machine, man was separated from nature. He fought against the introduction of the machine because he feared not only unemployment but also low wages, poor working conditions, injury to health, and lower standards of living. The machine, however, has also bestowed many boons on man: (1) It performs work formerly assigned to slaves, such as the excavation of raw materials. (2) Machines prepare and work raw materials more thoroughly and with less danger to health. (3) Carrying and transporting is done mechanically, whereas it was once done by children. (4) Dust control and other safeguards can be provided more efficiently in mechanized industry. (5) Firing technique is being improved to protect the health of workers. The ceramic industry, however, is still only incompletely mechanized, and there is a division of labor between man and the machine. The time formerly required for laborious tasks can now be utilized more profitably in the creation of new forms and improved methods and in research. Because of the long life of ceramic ware it behooves us to produce the best ware of which we are capable, as we shall be judged by it hundreds and even thousands of years hence.

M.V.C.

Making of Raku ware and its value in the teaching of beginner's pottery in America. WARREN GILBERTSON. *Bull. Amer. Ceram. Soc.*, **22** [2] 41–44 (1943).—2 drawings.

Measurement of thickness of fired-on gold coatings. K. H. BALLARD. *Ind. Eng. Chem., Anal. Ed.*, **14** [11] 868–69 (1942).—A jet-test method for measuring the thickness of liquid bright and burnished gold coatings on ceramics and two independent standardization methods for determining the stripping factors of the ammonium iodide-iodine-hydrochloric acid-Gardinol reagents have been developed. The stripping factors given apply to tests made on gold bands over 4 mm. in width, at a temperature of 25°C., and on gold coatings containing no interfering substances, e.g., platinum and silver. The method would be applicable to thickness measurements of ceramic coatings of gold alloys, but a stripping factor for each particular alloy must be ascertained. The method is rapid and, with reasonable care, should be accurate to ± 6%. Illustrated. F.G.H.

Ornamentation on hollow ware. FRITZ THEILMANN. *Keram. Rundschau*, **46** [27] 302–303 (1938).—Laws of the primary forms, types, and decorative elements of ceramic artware have been the same for all peoples. Even the ancients used the three main forms, the sphere, the cylinder, and the cone, and combinations of them. The principal family groups of decorations from which an endless variety of combinations is derived are (1) horizontal bands, lines, or grooves; (2) the less common vertical marking; (3) and (4) diagonal lines, which, when crossed, produce (5) network and diamond patterns or, when only their intersection points are retained, (6) uniformly spaced points; (7) the irregular arrangement of dots; and (8) the combining of several small dots into large unified areas or spots. The creative artist selects the type which best expresses his individuality. In placing ornamentation on an object, it must be remembered that the object will probably be viewed from above, and the underside will be less prominent; the center of interest, therefore, is better placed on the upper side of a rounded object. M.V.C.

Salt glazing of ceramic ware. H. G. SCHURECHT. *Bull. Amer. Ceram. Soc.*, **22** [2] 45–46 (1943).—9 references, 1 drawing.

Sculpture, its practice and malpractice. A. DREXLER JACOBSON. *Bull. Amer. Ceram. Soc.*, **22** [2] 37–39 (1943).

BOOK

Liverpool Transfer Designs on Anglo-American Pottery. R. H. MCCAULEY. Southworth-Anthoensen Press, Portland, Me. Price $7.50. Reviewed in *Jour. Roy. Soc. Arts*, **90** [4620] 632 (1942).—McC. traces the development of the pottery trade with America from the first efforts of the Liverpool potters to attract emigrants by suitable designs on jugs, mugs, and bowls to the extensive output by Staffordshire firms of blue and white ware decorated with views of buildings and scenery taken by their own artists in the U. S. The student of history will take particular interest in the chapter on designs relative to battles and heroes. With true English impartiality, the English potter illustrated the defeats sustained by the English fleet. Many specimens represent the War of 1812. Though originally made for the American market, many pieces returned to England. Collectors may still obtain rare examples from English dealers. Numerous illustrations of pieces from McCauley's private collection, those of other owners, and selections from museums increase the reference value of this work. The term "Liverpool," freely used in the text, applies to the transfer design rather than to the ware so decorated.

K.R.

PATENTS

Black ceramic pigments and method of preparation. HEINRICH DIEHL (vested in the Alien Property Custodian). U. S. 2,309,173, Jan. 26, 1943 (Jan. 11, 1940).—A process for preparing an improved ceramic pigment which comprises heating, to a temperature within the range 800° to 1100°C., a mixture of copper oxide, chromium oxide, and a mineralizing agent selected from the group which consists of compounds of molybdenum, tungsten, vanadium, uranium, iron, nickel, cobalt, and manganese, the metal compounds being capable of yielding the corresponding metal oxides during the heating.

Designs for:

Coffeepot. KARL SCHNEIDER (Sears, Roebuck and Co.). U. S. 134,876, Jan. 26, 1943 (Nov. 5, 1942).

Dutch oven. KARL SCHNEIDER (Sears, Roebuck and Co.). U. S. 134,877, Jan. 26, 1943 (Nov. 5, 1942).

Flower vase. JOHN POPPER. Can. 13,355 to 13,358, Oct. 3, 1942. Can. 13,382, Nov. 14, 1942. G.M.H.

Glass coffeemaker. F. S. BARBIERS (Anchor Hocking Glass Corp.). U. S. 134,823, Jan. 19, 1943 (May 15, 1942).

Glass dish. A. J. DREITZER (Pitman-Dreitzer & Co., Inc.). U. S. 134,860, Jan. 26, 1943 (Dec. 9, 1942).

Glass plate. C. T. SLOAN (Jeannette Glass Co.). U. S. 134,962, Feb. 2, 1943 (Aug. 27, 1941).

Square cream top bottle. CREAM TOP BOTTLE CORP. Can. 13,376, Nov. 14, 1942. G.M.H.

Swinging teapot. W. I. TYCER. U. S. 134,811, Jan. 19, 1943 (June 15, 1942).

Vase. BERNARDI AND NIERI. Can. 13,359, Oct. 3, 1942. CONTE & SALMASO REGISTERED. Can. 13,372 to 13,375, 13,385, and 13,386, Nov. 14, 1942. G.M.H.

Cements

MgO in Portland cement. J. L. HEITZMAN. *Rock Products*, **45** [12] 74, 82 (1942).—The 8-hydroxyquinoline method for determining MgO is described. B.C.R.

PATENTS

Plaster retarder. G. D. KING AND M. C. DAILEY (Canadian Gypsum Co., Ltd.). Can. 408,094, Oct. 20, 1942 (Aug. 21, 1941; in U. S. Nov. 4, 1940). G.M.H.

Stabilized gypsum plaster. G. L. HANN (Canadian Gypsum Co., Ltd.). Can. 409,326, Dec. 15, 1942 (Dec. 22, 1938; in U. S., with United States Gypsum Co. as assignee, Dec. 29, 1937). G.M.H.

Enamel

Cathodic pickling in the presence of inhibitors. W. MACHU AND O. UNGERSBÖCK. *Arch. Eisenhüttenwesen*, **15** [7] 301–306 (1942).—The advantages of pickling steel (in preparation for tinning, galvanizing, or enameling) by a combination process of chemical pickling with H_2SO_4 or HCl and cathodic pickling are described. Thorough tests have shown that cathodic treatment of steel at very low current densities in the presence of small quantities of organic inhibitors almost completely prevents dissolution of the metal. The amount of inhibitor needed is only $^1/_{10}$ to $^1/_{20}$ of that required for chemical pickling with inhibitors, while the current densities are only $^1/_{100}$ to $^1/_{1000}$ of those applied with cathodic pickling. The combined chemical-electrolytic pickling produces a more uniform, brighter, and smoother surface without deeply etched grooves or fine cracks in the surface. Electrical energy and inhibitor are saved, and only very little H is absorbed by the steel; the H is easily removed again by keeping the steel in water. The pickling effect can easily be controlled by regulating the current density. M.HA.

Heat-treatment of cast iron. CHARLES A. NAGLER AND RALPH L. DOWDELL. *Trans. Amer. Foundrymen's Assn.*, **49** [2] 361–87 (1941).—The authors investigated variations in hardness caused by the heat-treatment of cast iron and have attempted to correlate the resulting microstructures with the hardness values obtained. Two types of heat-treatment were used, viz., quenching and tempering and isothermal transformation by quenching in a salt bath at elevated temperatures. The results of treatments over a wide range of temperatures are given. H.E.S.

Mechanics of enamel adherence: XIV, (1) Role of cobalt oxide in metal and oxide precipitation during ground-coat firing cycle and (2) determination of temperature and time intervals of precipitation. R. M. KING. *Jour. Amer. Ceram. Soc.*, **26** [2] 41–48 (1943).—11 references, 6 figures.

Mechanism of pinhole formation. C. E. SIMS AND C. A. ZAPFFE. *Trans. Amer. Foundrymen's Assn.*, **49** [2] 255–81 (1941).—The authors studied the causes of pinhole formation in steel castings and conclude that this phenomenon is caused chiefly by hydrogen. They describe pinholes and explain the various theories of their formation, showing why such theories must be discarded. Holding to the theory that porosity is caused by gas precipitated from the steel, they explain why the carbon-FeO reaction as the basis for a theory is not tenable and why the hydrogen-FeO reaction affords logical explanation for the formation of pinholes. H.E.S.

PATENTS

Apparatus for enameling rectangular wire. E. J. FLYNN (General Electric Co.). U. S. 2,309,057, Jan. 19, 1943 (July 17, 1940).

Lead-free enamel. R. W. GOODWIN (Canadian General Electric Co., Ltd.). Can. 408,087, Oct. 20, 1942 (March 5, 1940). G.M.H.

Zirconium oxide opacifier. C. J. KINZIE (Titanium Alloy Mfg. Co.). Can. 408,432, Nov. 3, 1942 (Oct. 23, 1939; in U. S. Nov. 1, 1938). G.M.H.

Glass

Adsorption of ions by leached surface films on glass. HAROLD C. HAFNER AND FRANK L. JONES. *Jour. Amer. Ceram. Soc.*, **26** [2] 55–56 (1943).—1 figure.

Amber glass and the role of carbon. HENRY MOORE AND S. R. SCHOLES. *Jour. Amer. Ceram. Soc.*, **26** [2] 58–60 (1943).—14 references.

Batch quality and its evaluation. P. E. US. *Stekolnaya Prom.*, **15** [3] 3 (1939).—Methods used by the Lisichanskiĭ Glass Works to control the quality of the batch are described. M.V.C.

Behavior of tuck-stones in a glass tank furnace. J. H. PARTRIDGE. *Jour. Soc. Glass Tech.*, **26** [116] 172–76T (1942).—Electric-light bulbs are made from a soda-lime-magnesia-silica glass (70 SiO_2, 16.5 Na_2O, 7 CaO, 3.5 MgO, and 2% Al_2O_3) melted at about 1400° in a tank furnace lined, as a rule, with fire-clay blocks. The gap between them and the side wall of the furnace is closed by small fire-clay tuck-stones resting on top of the tank blocks. It is evident that the peritectic reaction, i.e., one in which a solid phase decomposes to form a liquid phase plus a second solid phase, occurring in the SiO_2–Al_2O_3 binary system, took place in the tuck-stone refractory under the conditions obtaining in the glassmelting furnace. The reaction is as follows: mullite → corundum + siliceous liquid phase. Although tuck-stones are not in contact with molten glass, they are affected by batch dust, which presumably assists in the liquefaction of the glassy matrix, and this flows down the surface of the blocks. The corrosion of the tuck-stones has a twofold effect, one on the tank blocks and the other on the glass. The examination of refractories from the viewpoint of the comparative fluidity of the glassy matrix is therefore important in choosing suitable protective tuck-stones. R.H.B.

Colored glass—violet color. BRUNO SCHWEIG. *Glass*, **19** [5] 118–20, 133 (1942).—In producing violet glasses by the use of manganese compounds, a low proportion of silica, an oxidizing atmosphere, and oxidizing agents in the batch facilitate the formation of the violet color. Manganese color exhibits brownish tints in artificial light and is benefited by long continued exposure to ultraviolet rays. Violet glasses may be produced with nickel regardless of whether the batch and atmosphere are oxidizing or reducing, but the color is dependent on the batch composition as both violet and yellow may result. Neodymium, titanium, beryllium, zirconium, and lanthanum may also be used for producing a violet color. See *Ceram. Abs.*, **21** [8] 165 (1942). B.C.R.

Cords, surface condition, and quality of glassware. A. J. HOLLAND, ERIC PRESTON, AND W. E. S. TURNER. *Jour. Soc. Glass Tech.*, **26** [116] 177–95T (1942).—A comparison was made of the direct shadow, polariscopic, and photo-optical methods of estimating the degree of cordiness of glass by the examination of numerous samples of cordy glass obtained from eight experimental melts made under controlled conditions. For routine comparison and control, the direct shadow method is extremely sensitive; satisfactory estimates of cord can be made by it, and a "figure of merit" may be obtained. The polariscope method is less sensitive for direct inspection and is most useful in the examination of ring sections, by means of which the distribution of glass throughout the article can be checked. The photo-optical method gives a measure of the cords present, depending only on the accuracy and sensitivity of the apparatus employed. By this method the direct shadow prints may be graded. A variant of the thermostatically controlled centrifuge of Turnbull and Ghering (*Jour. Amer. Ceram. Soc.*, **24** [8] 264–70 (1941)) was built to separate glass of differing densities from finely powdered samples. An estimate of inhomogeneity may be obtained by giving the total density spread of a sample or the mass-density distribution in the form of a grading curve. A general comparison of surface defects can be made by a shadow method, but optical or photographic methods are preferred. Examples are given of the general surface condition of pressed, blown, and blown and spun ware made by automatic machinery. A numerical value for surface condition is more difficult to obtain than a value for cord, but satisfactory "figures of merit" were derived from photographs of the surface at magnifications between 50 and 100 under conditions of oblique illumination. The dependence of surface condition of the

ware on that of the mold is illustrated by photographs of samples of a small panel bottle taken at regular intervals throughout the mold life. It is suggested that the methods discussed be more widely adopted in routine control of glass quality. R.H.B.

Crucible melting with modern gas burners. F. L. WOLF. *Trans. Amer. Foundrymen's Assn.*, **48**, 347–54 (1940).—Operating results are presented for an insulated stationary No. 60 crucible furnace using natural gas and melting a variety of nonferrous alloys. Modern burner equipment results in a considerable saving in gas with greater melting speed and increased crucible life. A truly neutral atmosphere is obtained without requiring any skill on the part of the operator. The flame temperature is higher, and the service is severe on refractories even though they are of the superduty type. H.E.S.

Depreciation and maintenance of glass furnaces and melting tanks: I–IV. S. HOWARD WITHEY. *Glass*, **19** [6] 149–50; [7] 180–81; [8] 208, 211; [9] 236–37 (1942).—Accounting methods are described. B.C.R.

Drawing flat glass without a debiteuse. M. S. KAZANSKIĬ. *Stekolnaya Prom.*, **15** [5] 14–21 (1939).—Details of construction of a machine for drawing glass without a debiteuse are given. An ordinary glass of Fourcault composition was used. M.V.C.

Effect of chemically formed surface films on glass solubility. FRANK L. JONES AND HAROLD C. HAFNER. *Jour. Amer. Ceram. Soc.*, **26** [2] 56–58 (1943).—2 references.

Glass "goes to town." J. R. HILDEBRAND. *Nat. Geographic Mag.*, **83** [1] 1–48 (1943).—H. describes the new products in glass developed by American industry, many of them substitutes for critical war materials: honeycomb, engraved, elastic, and stained glass, industrial glass piping, Christmas tree ornaments, chemical ware, safety glass, fluorescent glass, mirrors, optical glass, fiber glass, Vitrolite, insulators, cooking ware, murals, tableware, and plate and window glass. The article is well written and profusely illustrated with twenty-two photographs in color and thirty-three in black and white.

Invisibly colored glass: I–III. BRUNO SCHWEIG. *Glass*, **19** [7] 174–76; [8] 199–203; [9] 230–32, 235, 237 (1942).—Methods of producing glasses transparent to ultraviolet rays are described, and several batch compositions are given. The beneficial effect of ultraviolet light on the growth and health of human beings has been demonstrated experimentally. Ultraviolet-absorbing glasses are used almost solely as a protection for the eyes, as the wave lengths 0.375 to 0.350 μ are outstandingly detrimental, possibly a cause of old-age cataracts. Higher oxides of iron and titanium are most generally used in this type of glass, followed by cerium, vanadium, and cadmium. Some materials eliminate the blue rays as well, imparting a yellow coloration to the glass. Batch compositions using cerium under reducing conditions, titanium, and vanadium, alone or combined with each other and with antimony, are given. Titanium is about one half as effective as cerium. For snow goggles, neodymium is used to increase the contrast of the red, green, and blue, vanadium is added to eliminate the ultraviolet, and cobalt plus either nickel or manganese is added to obviate the green color imparted by the vanadium. X-ray absorbent glasses utilize a high lead or barium content; zirconium may be substituted for part of the silica. Batch compositions are given. In infrared-transmitting glasses, ferrous iron and oxides of copper, cobalt, nickel, and vanadium should be absent. B.C.R.

Origin of the lamp chimney and its manufacture in the U. S. ANON. *Nat. Glass Budget*, **58** [20] 12 (1942).—The lighting industry in the U. S. has undergone three important developments since the day of the candle: (1) the introduction of the oil lamp and its glass chimney, (2) electricity and the glass bulb, and (3) fluorescent lighting. The first lamp chimneys were probably made in France near the close of the 18th century for the Argand burner. Thomas Evans and George A. Macbeth are recognized as the most prominent men in the manufacture of glass chimneys in the U. S. The history and development of the lamp chimney are traced through the Vesta lamp for the use of oil spirits of turpentine up to the present oil lamps utilizing cheap oil for illumination. In 1939, there were 1,663,409 dozens of lamp chimneys manufactured in the U. S. H.E.S.

Shatter-resistant coating for glass. ANON. *Rev. Sci. Instruments*, **13** [10] 467 (1942).—A transparent material for application on glass to prevent shattering has been developed by the Wilbur & Williams Co., Boston, Mass. It passes sunlight with little absorption and weathers well without discoloration. It dries quickly, forming a strong, tough film having a tensile strength of 3000 to 5000 lb. per sq. in. Elongation is over 20%, permitting considerable movement of the glass without rupture of the film. It is claimed to be useful in a period of active bombing. H.E.S.

Specification of a polariscope method for testing the annealing of glass containers. *Jour. Soc. Glass Tech.*, **26** [116] 68–72P (1942).—In this specification, drawn up by the Annealing of Glass Subcommittee, a method is described for determining the relative internal stress in glass containers by using glass disks strained to a known degree as standards of reference. Records of variations in annealing may thus be obtained, and the results of different observers may be correlated. The method is to be applied to the whole container and not to ring or other sections cut from it. It is devised for colorless or pale-green containers and is not applicable to deeply colored glassware. R.H.B.

White-colored or opal glass. BRUNO SCHWEIG. *Glass*, **19** [11] 289–92 (1942).—The white color is due to the presence of light-scattering inclusions in the glass. These inclusions may be either transparent or opaque. There is some disagreement concerning the physical state of the transparent inclusions; some investigators believe that they are devitrified crystals, while others think that one liquid is suspended in another to form an emulsion. Materials for producing opal glass are listed. B.C.R.

PATENTS

Apparatus for manufacturing glassware. H. R. SCHUTZ AND C. R. VINING (Libbey Glass Co.). U. S. 2,307,425, Jan. 5, 1943 (June 3, 1939).

Apparatus for sealing containers. H. E. STOVER (Anchor Hocking Glass Corp.). U. S. 2,309,548, Jan. 26, 1943 (Feb. 16, 1940).

Apparatus for tempering glass. J. L. DRAKE (Libbey-Owens-Ford Glass Co.). U. S. 2,308,062, Jan. 12, 1943 (June 2, 1938; Nov. 23, 1940).—In combination, an apparatus for making bent tempered glass sheets including bending means and cooling means adapted to successively receive the glass sheet and being superimposed, respectively, one above the other.

Art of grinding and polishing glass and apparatus therefor. R. C. BENNER (Carborundum Co.). U. S. 2,309,819, Feb. 2, 1943 (April 18, 1941).

Black glass and method of making. J. D. SULLIVAN AND C. R. AUSTIN (Battelle Memorial Inst.). U. S. 2,309,071, Jan. 19, 1943 (March 21, 1941).—A batch composition for producing a black glass having a soda-lime-silica base, the batch composition containing at least 0.04% selenium, at least 0.1% of a substance selected from the group consisting of cobalt, nickel, iron, and their compounds, and a reducing agent.

Cooling nozzle for tempering hollow glassware. W. E. AKSOMITAS (Hartford-Empire Co.) U. S. 2,309,290, Jan. 26, 1943 (Nov. 25, 1939).

Glass batch feeding apparatus. H. L. HALBACH, W. G. KOUPAL, AND WILLIAM OWEN (Pittsburgh Plate Glass Co.). Can. 409,243, Dec. 8, 1942 (July 24, 1941). J. H. REDSHAW (Pittsburgh Plate Glass Co.). Can. 409,242, Dec. 8, 1942 (June 19, 1941). G.M.H.

Glass compositions. L. MELLERSH-JACKSON (Hartford-Empire Co.). Brit. 548,896, Nov. 11, 1942 (July 1, 1941).

Glass-fiber processing and articles. H. P. HOOD (Fiberglas Canada, Ltd.). Can. 409,341, Dec. 15, 1942 (Nov. 2, 1939; in U. S., with Owens-Corning Fiberglas Corp. as assignee, Nov. 4, 1939). G.M.H.

Glass of a high softening point. WALTER HÄNLEIN (Canadian General Electric Co., Ltd.). Can. 408,661, Nov. 17, 1942 (Sept. 13, 1938). G.M.H.

Glassmelting and fining apparatus. GAMES SLAYTER (Fiberglas Canada, Ltd.). Can. 408,174, Oct. 20, 1942 (May 6, 1941). G.M.H.

Glass mold operating mechanism. E. G. BRIDGES (Lynch Corp.). U. S. 2,307,563, Jan. 5, 1943 (Aug. 16, 1939).

Glass solution and glass coating. R. N. WENZEL (Westinghouse Electric & Mfg. Co.). U. S. 2,308,409, Jan. 12, 1943 (March 16, 1940).—An insulated electrical conductor comprising, in combination, a conductor, a porous inorganic insulating covering capable of withstanding temperatures at which glass fuses on the conductor, and glass applied to the porous inorganic covering, the glass composed of an initial coating of a lead borate base glass impregnating the porous covering for preconditioning the porous covering and subsequent amounts of fused glass applied to the preconditioned covering to provide for predetermined electric insulation.

Glass tube reshaping apparatus. C. E. HAHN AND JOHN SALO (Canadian General Electric Co., Ltd.). Can. 409,317, Dec. 15, 1942 (Oct. 30, 1940). G.M.H.

Glassware-blowing mechanism. E. G. BRIDGES (Lynch Corp.). U. S. 2,307,565, Jan. 5, 1943 (Aug. 1, 1940).

Glassware-forming apparatus. G. E. ROWE (Dominion Glass Co., Ltd.). Can. 409,198, Dec. 8, 1942 (Aug. 10, 1939). G.M.H.

Glassware-handling mechanism. G. B. LANGER AND J. R. BRIDGES (Lynch Corp.). U. S. 2,307,517, Jan. 5, 1943 (Sept. 29, 1939).

Glow lamp. C. H. VENNER AND L. A. HERZIG (Lon-Ga-Tone, Inc.). Can. 407,865, Oct. 6, 1942 (Nov. 9, 1939). G.M.H.

Hermetic seals between refractory metal and vitreous material. SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., AND A. J. MEADOWCROFT. Brit. 549,373, Dec. 2, 1942 (May 23, 1941).

Incandescent lamp. R. S. BAEZ. Can. 407,758, Oct. 6, 1942 (April 4, 1941). G.M.H.

Lens. M. J. HERZBERGER AND H. O. HOADLEY (Eastman Kodak Co.). U. S. 2,308,007, Jan. 12, 1943 (Oct. 29, 1941).

Lens grinding and polishing machine. R. C. DAVID (Fosgood Corp.). U. S. 2,309,936, Feb. 2, 1943 (Dec. 23, 1940). D. TAYLOR. Brit. 549,604, Dec. 9, 1942 (April 26, 1941).

Machine for making hollow glass articles. E. G. BRIDGES (Lynch Corp.). U. S. 2,307,564, Jan. 5, 1943 (Aug. 1, 1940).

Matted glass wool making apparatus. DALE KLEIST AND GAMES SLAYTER (Fiberglas Canada, Ltd.). Can. 407,855, Oct. 6, 1942 (Nov. 27, 1937; in U. S., with Owens-Illinois Glass Co. as original assignee, April 14, 1937). G.M.H.

Means for marking lenses and similar articles. L. W. GODDU AND I. C. CRAWFORD (American Optical Co.). U. S. 2,307,501, Jan. 5, 1943 (June 20, 1939; June 12, 1941).

Method and apparatus for handling and tempering glass. D. G. MERRILL (Hartford-Empire Co.). U. S. 2,309,325, Jan. 26, 1943 (Nov. 25, 1939).

Method and apparatus for surfacing glass. M. L. DEVOL, P. W. CRIST, AND E. J. HAZEN (Pittsburgh Plate Glass Co.). U. S. 2,309,831, Feb. 2, 1943 (March 11, 1941).

Mounting for plural glassware-forming neck pins and thimbles. W. K. BERTHOLD (Hartford-Empire Co.). U. S. 2,309,378, Jan. 26, 1943 (Feb. 17, 1941).

Multiple laminated glass. R. E. RICHARDSON (Duplate Safety Glass Co. of Canada, Ltd.). Can. 409,335, Dec. 15, 1942 (Aug. 2, 1941). G.M.H.

Nonrefillable bottle. J. A. PATTERSON. Can. 407,928, Oct. 13, 1942 (Oct. 28, 1941). G.M.H.

Preparation of selenium ruby glass. C. R. AUSTIN AND J. D. SULLIVAN (Battelle Memorial Inst.). U. S. 2,309,-070, Jan. 19, 1943 (Sept. 17, 1940).—The process of preparing a selenium ruby glass which consists in melting a glass batch having a soda-lime-silica base and containing selenium, cadmium sulfide, and alumina at a temperature ranging from 2600° to 2700°F., withdrawing the glass from the melt at a temperature ranging from 1800° to 2300°F., holding the glass in a zone at a temperature ranging from 1400° to 2100°F. for a period sufficient to develop the desired color, forming the glass into the desired article, and subjecting the formed article to a strain-relieving anneal.

Production of glass fibers. A. E. EDWARDS. Brit. 548,974, Nov. 11, 1942 (April 29, 1940).

Quartz lamp seal. G. A. FREEMAN (Canadian Westinghouse Co., Ltd.). Can. 408,521, Nov. 10, 1942 (June 10, 1940; in U. S. July 15, 1939). G.M.H.

Refractory for contact with molten glass and process for making. H. A. WADMAN AND R. A. SCHAEFER (Hartford-Empire Co.). U. S. 2,308,473, Jan. 12, 1943 (Sept. 7, 1939).—The method of making a glass-contacting refractory having a surface layer integral with the interior thereof and having high resistance to heat shock which comprises casting in a mold a batch having, when fired, high resistance to corrosion and a certain coefficient of expansion and, after a surface layer of desired thickness has set in the mold, draining the surplus from within the shell thus formed, casting within the shell a batch for the interior of the refractory which, when fired, has a lower coefficient of expansion than the surface layer, removing the casting from the mold, and firing the casting to set up tension in the surface layer on the interior.

Refractory glass. J. H. PARTRIDGE (Canadian General Electric Co., Ltd.). Can. 408,662, Nov. 17, 1942 (Nov. 1, 1938). G.M.H.

Sodium calcium borosilicate glass. U. E. BOWES (Owens-Corning Fiberglas Corp.). U. S. 2,308,857, Jan. 19, 1943 (Dec. 20, 1939).—Glass in fibrous form having a composition comprising SiO_2 60 to 65, CaO and MgO 15 to 20, Na_2O and K_2O 8 to 12, B_2O_3 2 to 7, and R_2O_3 2 to 6%, wherein the proportion of lime to magnesia is at least 1:1 but less than 8:1.

Structural Clay Products

Salt glazes for structural building units. H. D. FOSTER. *Jour. Amer. Ceram. Soc.*, **26** [2] 60–67 (1943).—3 references, 9 figures.

Structural clay plant problems. ANON. *Brick & Clay Record*, **101** [1] 24–25 (1942).—Laminations in sewer pipe using deaired clay may be eliminated through the use of drier clay and the maintenance of a minimum space between the auger and the liners, as an increase in this space results in greater quantities of clay composed of layers being fed back to the clay stream. In the production of hollow tile, a rapid flow of material caused by a certain section of the die may be corrected by the use of a die of uniform taper. Stain on ware in driers using waste heat from kilns may be caused by condensation of SO_2 and water. B.C.R.

PATENTS

Hollow tile. C. M. MORSSEN. Can. 408,775, Nov. 24 1942 (April 17, 1941). G.M.H.

Reinforced ceramic material. J. R. PARSONS (U. S. Gypsum Co.). U. S. 2,307,332, Jan. 5, 1943 (May 9, 1938).—A relatively thin reinforced ceramic building slab comprising an aggregate of discrete ceramic particles and a thermostable reinforcing agent, the particles being bonded to each other as well as to the reinforcing agent at their respective points of contact by means of a solidified fusible inorganic bonding material which has a fusion temperature lower than that of the particles and of the agent.

Refractories

Action of chlorine on refractory materials: I. L. R. BARRETT, F. H. CLEWS, AND A. T. GREEN. Reprinted in *Trans. Brit. Ceram. Soc.*, **41** [8] 191–96 (1942). **II.** H. M. RICHARDSON, F. H. CLEWS, AND A. T. GREEN. *Ibid.*, pp. 196–205; see *Ceram. Abs.*, **21** [1] 13; [10] 212 (1942). R.A.H.

American Foundrymen's Assn. Research Foundation. ANON. *Bull. Amer. Ceram. Soc.*, **22** [2] 53 (1943).

Application of equilibrium diagrams to the study of refractory materials. N. E. DOBBINS. *Refrac. Jour.*, **17** [5] 173, 175, 177, 179, 180, 183, 185; [6] 203, 205, 207, 209, 211, 213, 215, 217, 219, 221 (1941).—In discussing the reactions occurring during the firing of fire-clay, silica, magnesite, forsterite, and dolomite refractories, D. emphasizes the importance of applying equilibrium diagrams only to the surface of the grains and the interstitial liquid, as it is only there that equilibrium conditions may be approached. A better correlation between the equilibrium diagrams and observed facts can be made if certain physical properties of the reactants are considered, such as viscosity of slag, porosity, degree of cohesion between grog and matrix, rate of removal of reactants, surface area of refractory particles, etc. Equilibrium data are applied to the reactions occurring in blast furnaces and acid open hearths between slag and refractory. B.C.R.

Basic British brick. ANON. *Iron and Steel*, **15** [12] 377 (1942).—This brief editorial on the necessity of readjustment and the desirability of research cites England's present independence of imported magnesite through the development of stabilized and semistabilized dolomite brick. E.H.McC.

Canadian basic refractory practice; Algoma Steel Corp., Ltd. J. W. CRAIG. *Iron and Steel*, **16** [1] 15–18 (1942).—Virtually all basic refractories used are from domestic Quebec magnesites. The trade names mentioned below refer to products of Canadian Refractories, Ltd. In open-hearth practice, the chief factor is maintenance of the hearth. This is accomplished by using raw dolomite with domestic grain magnesite, Magnifrit (Basifrit in the U. S.; Basifirm in England). Ramix, a chemically bonded ramming material with a magnesia base, has also been used with two important advantages: (1) a much higher yield of steel over burned-in hearths and (2) a great reduction in the amount of grain magnesite used for fettling in the first two campaigns. Tapholes are made of Plastic 695, which is also used for patching. The basic brick Magnecon, a magnesite-chrome product especially resistant to spalling, has recently been used in front walls (laid with Magset cement) and in hearths. Roofs of silica brick show greatly extended life through the use of Silica No. 40 cement. Magnecon gives good results in metal mixers and soaking pits. E.H.McC.

Carolina topaz as a substitute for kyanite. OLIVER C. RALSTON. *Brick & Clay Record*, **101** [1] 40, 42 (1942).—Topaz in lumps 1 in. in diameter or smaller may be calcined satisfactorily in a rotary kiln. The greatest difficulty appears to be in the recovery of the fluorine evolved during calcination. The large amount present precludes discharging the gases into the atmosphere. See "Topaz...," *Ceram. Abs.*, **21** [1] 25 (1942); *Bull. Amer. Ceram. Soc.*, **21** [7] 135–39 (1942). B.C.R.

Comparison of refractories for cupola service. J. A. BOWERS AND J. T. MACKENZIE. *Trans. Amer. Foundrymen's Assn.*, **48,** 193–205 (1940).—The cost of refractories for the 21- and 54-in. diameter circular cupolas and the 102- x 72-in. link-shaped cupola was studied. Tests in the larger cupolas were conducted during a regular day's production, all factors being held as constant as possible with the exception of the lining. Figures given include costs both with and without labor costs involved. The authors conclude that each refractory investigated is economical under certain conditions. H.E.S.

Improvements in gas melting furnaces in the nonferrous foundry. E. W. WILLIAMS. *Trans. Amer. Foundrymen's Assn.*, **48** [4] 641–56 (1941); see "Gas . . .," *Ceram. Abs.*, **20** [1] 18 (1941). H.E.S.

Influence of solar oil on Dinas brick for coke ovens. S. L. GERMAN. *Ukrain. Nauch.-Issledovatel. Inst. Ogneuporov & Kislotouporov*, No. 45, pp. 122–25 (1939).—Solar oil at temperatures of 850° to 1100° has a definite effect on silica brick. An examination of the microstructure of samples showed 3 zones: a black, a gray, and an unchanged zone. The black zone contained 1.05 to 7.62 carbon with a larger number of tridymite crystals of larger size, some carbonlike material, and graphite particles dispersed in the silica body. Most of the brick became more porous. The mechanical resistance of silica brick affected by solar oil decreased materially. M.V.C.

Influence of working conditions on the durability of blast-furnace linings. G. R. RIGBY AND A. T. GREEN. *Bull. Brit. Refrac. Research Assn.*, No. 55, p. 39 (1940); reprinted in *Iron & Steel Inst. Special Rept.*, No. 28, pp. 103–30 (1942).—Conditions prevailing during a blast furnace campaign are analyzed. Collected data indicate the wide variations which have occurred in the stacks of different blast furnaces due to segregation of the burden. Factors governing burden distribution have an important influence on the temperatures prevailing at the lining face. Abnormal conditions in the stack cause channeling of the lining in specific parts of the furnace. Reported investigations on the linings of blown-out furnaces are reviewed, and data obtained from a number of recently blown-out furnaces are incorporated. A summary is given of the laboratory investigations on such important aspects of refractory materials as carbon monoxide disintegration, alkali attack, and the action of blast-furnace slags. The properties which refractory materials for blast furnaces should possess are considered in the section dealing with the choice of materials for the lining. The influence of water-cooling in the stack, the effect of insulation, and the blowing-in of the furnace are also discussed. P.S.D.

Insulating firebrick. H. B. BARBER. Presented at meeting of Refractories Division, American Ceramic Society, Dearborn, Mich., Aug., 1942; abstracted in *Brick & Clay Record*, **101** [3] 52, 54 (1942).—Advantages gained through the use of insulating firebrick include (1) a reduction in the weight of the furnace, thus eliminating the necessity of construction on the ground floor and making the furnace either movable or portable; (2) cheaper construction; (3) fuel economy; (4) a reduction in heating-up time; and (5) a reduction in door heat loss. Consumption of this type of brick by the Surface Combustion Corp. has increased from 1800 M in 1940 to 8000 M in 1942. B.C.R.

Mechanical production of open-hearth steel-pouring refractories. G. N. KOCHERGA. *Ogneupory*, **1940,** No. 5–6, pp. 326–29.—A new press developed by I. K. Mamaĭ for the manufacture of steel-pouring refractories is described. M.V.C.

Petit's method for assessing the suitability of a refractory for a specific service. A. K. SILNITSKIĬ. *Ogneupory*, **1940,** No. 5–6, pp. 336–37.—D. Petit attempted to reproduce the behavior of refractories and to develop a method of testing their properties ("Assessing . . .," *Ceram. Abs.*, **18** [11] 298 (1939)). According to S., however, the point on the curve selected by Petit as the "criterion of safety" is not sufficiently characteristic with regard to the determination of deformation under load at high temperatures. M.V.C.

Quantitative corrosion test for refractories. J. F. HYSLOP. *Trans. Brit. Ceram. Soc.*, **41** [6] 165 (1942).—The steps for this test are as follows: (*a*) Drill a hole in the test brick. (*b*) Fill with a definite weight of slag. (*c*) Heat for a given time at a specified temperature. (*d*) Cool, refill with slag, and reheat. (*e*) Continue this slag and heat treatment a definite number of times. (*f*) Invert the test piece, set it on a refractory crucible, raise it to the chosen slagging temperature, and hold the temperature long enough to allow the slag to drain into the crucible. (*g*) Measure the volume of the corroded cavity by filling it with liquid. R.A.H.

Simple partially stabilized dolomite mixture. W. J. REES. *Bull. Brit. Refrac. Research Assn.*, No. 56, p. 268 (1940); reprinted in *Iron & Steel Inst. Special Rept.*, No. 28, pp. 101–102 (1942).—A mixture of 95 ground dolomite, 2.5 ball clay, and 2.5% mill scale was tempered with 10% water containing a little sulfite lye, briquetted, dried, and fired at 1500°C. After 6 weeks' exposure to the atmosphere of the laboratory, the briquettes were still strong and showed no disintegration. Several briquettes were crushed, graded, and formed into test specimens which were fired at 1520° to 1550°C. Results obtained indicate that brick made from this mixture are likely to have better slag resistance and spalling resistance than brick made from a dolomite which has been completely stabilized by the addition of silica or a silicate such as serpentine, etc., sufficient to convert the lime into the dicalcium or tricalcium silicate. Brick made from this mixture with a firing temperature near that used in the laboratory would not be so stable to ordinary atmospheric conditions as the completely stabilized brick, but the indications are that they would keep for some weeks without any change through hydration. P.S.D.

Spool checker system for regenerative-type furnaces. C. A. FREEMAN. *Ind. Heating*, **9** [12] 1686–90, 1698 (1942).—An increase in efficiency of the regenerative-type furnace is brought about by a recent design of a checker system that does not clog up easily. It is of the self-interlocking type with complete stability for all cleaning practices. The spool checker system uses a combination of 9-in. straight firebrick and one special shape in such proportion that the 9-in. straights comprise two-thirds of the system. The special shape has the form of a spool and forms circular channels giving high checker volume with large exposed surface area and no flat surfaces for building up furnace dust. Spool checkers installed in a 150-ton open-hearth furnace were still in good condition after 453 heats. The fuel rate did not increase from that at the start of the campaign, and no brick had to be replaced. M.HA.

Steel-pouring refractories in foundry practice. R. H. STONE. *Trans. Amer. Foundrymen's Assn.*, **50** [3] 804–14 (1943).—S. deals with the design, assembly, and use of refractories in steel foundries. He divides refractories into two classes, basic and acid. He discusses requirements for sleeves and tests made on sleeve brick and then takes up nozzles, their design, the function of the stopper head-nozzle combination, and factors in the wear of nozzles and stoppers. The flow of heat in the stopper and the selection and care of stopper heads is also discussed. 4 figures. H.E.S.

Summary of other published work of the British Refractories Research Assn. of interest to the iron and steel industry. ANON. *Iron & Steel Inst. Special Rept.*, No. 28, pp. 155–68 (1942).—A short summary is given of research work on basic refractories and on the action of slags, vapors, and gases on refractory materials. P.S.D.

Temperature gradients through blast-furnace linings: I, Investigation of a furnace not fitted with a stack cooling system. G. R. RIGBY, H. BOOTH, AND A. T. GREEN. *Bull. Brit. Refrac. Research Assn.*, No. 58, p. 1 (1941); reprinted in *Iron & Steel Inst. Special Rept.*, No. 28, pp. 131–54 (1942).—An attempt was made to determine the rate at which a blast-furnace lining wears back by inserting thermocouples in five planes in the stack and bosh and taking continuous records of the temperatures. The results indicated the formation and subsequent removal of temporary scars in the bosh region. The temperature records for the stack were correlated with variations in the flow of the blast through the stack due to burden changes. The computed furnace lines at the end of the campaign compare satisfactorily with the lines as actually measured. It is considered possible to obtain, from such temperature data, an estimate of the lines of the furnace at any particular time during a campaign. In an appendix, the effect of segregation of the burden on the life of the lining is treated in a general manner. P.S.D.

Testing methods for the thermal stability and additional shrinkage of lightweight refractories. V. P. ZEGZHDA. *Ogneupory*, **1940**, No. 3, pp. 171–76.—Methods developed by Z. at the Leningrad Institute for Refractories are described. M.V.C.

Work of Open-Hearth Refractories Joint Panel, 1939–1942. ANON. *Iron & Steel Inst. Special Rept.*, No. 28, pp. 7–11 (1942).—A brief summary of research work carried out during the period 1939–1942, with special emphasis on significant results, is presented. P.S.D.

BULLETINS

Annual Report of the Refractories Fellowship at Mellon Institute for the year 1941–42. S. M. PHELPS. *Amer. Refrac. Inst. Tech. Bull.*, No. 78, 8 pp. (June, 1942).—Improved facilities for testing refractories are described. Such fellowship studies as P.C.E. tests, recommended practice for the panel spalling test, specifications for plastic fire-clay refractories, consistency meter for mortars, water-retention test, and methods for detecting iron in clay are described. H.E.S.

Tests for Refractories and Charges for Conducting Them. S. M. PHELPS. *Amer. Refrac. Inst. Tech. Bull.*, No. 77, 10 pp. (Jan., 1942).—Charges for conducting tests on refractories, fire clays, cold-set mortars, and insulating firebrick and for chemical analysis are given. H.E.S.

PATENTS

Furnace checkerwork. G. P. REINTJES. U. S. 2,309,789, Feb. 2, 1943 (Aug. 31, 1940).

Manufacture of magnesium products from sea water, brine, etc. OCEAN SALTS, LTD., W. E. PRYTHERCH, J. H. ANDERSON, AND B. A. ADAMS. Brit. 549,492, Dec. 9, 1942 (April 29, 1941).

Spalling-resistant refractory. N. P. PITT, A. C. HALFERDAHL, AND F. E. LATHE. Can. 407,898, Oct. 6, 1942 (Dec. 11, 1939).—A method of making a refractory material for spalling-resistant brick, furnace linings, etc., comprises mixing ground calcium silicate clinker having a lime to silica ratio of between 1.8 and 2.4 with chrome ore of coarser particle size and containing not substantially more than 4% of reactive silica, the chrome ore constituting not less than 4 nor more than 50% of the total mass. G.M.H.

Terra Cotta

Manufacture of flowerpots. J. G. *Keram. Rundschau*, **46** [43] 503–505 (1938).—In plants that manufacture flowerpots exclusively, many important factors receive attention which cannot be given to them in plants manufacturing flowerpots as a side issue; a better quality ware, thin-walled yet hard fired and weather- and frost-resistant, which is also sufficiently porous and air pervious for proper plant growth, can be produced more economically. Steps in the production are described. See *Ceram. Abs.*, **16** [1] 26 (1937). M.V.C.

PATENT

Tile sagger unloading apparatus. W. O. BENNING (Pacific Clay Products Co.). U. S. 2,307,194, Jan. 5, 1943 (July 15, 1940).—Apparatus for unloading tile from saggers.

Whiteware

Ceramic kitchenware. ANON. *Brick & Clay Record*, **101** [1] 44 (1942).—The manufacture of colored clay kitchenware is contemplated. B.C.R.

Evenly shaped porcelain plates. W. N. *Keram. Rundschau*, **46** [43] 508 (1938).—Factors which cause defects include (1) an imperfectly adjusted mold which

causes the marli to have the wrong slant (this flaw may also be caused by a body which is too soft and which shrinks too much); (2) a body which is not sufficiently plastic; and (3) crooked or badly lubricated saggers. The best guarantee for producing an evenly shaped plate is afforded by a mold on an inside mold. M.V.C.

Manufacture of frits. W. B. *Keram. Rundschau*, **46** [39] 459–60 (1938).—The principal constituents of fritted glazes for whiteware, earthenware, stove tile, and similar ware are given together with suggestions on the cheapest and most reliable manufacturing methods. M.V.C.

Recrystallized alumina products: I–III. BURROWS MOORE. *Ind. Chemist*, **18** [210] 236–40; [211] 306–309; [212] 337–38 (1942).—The development of products from various crystalline forms of alumina is described. The raw-material sources are given, and the principal methods of shaping are listed: (1) slipcasting, (2) extrusion (including deairing), (3) cold and hot pressing, (4) injection molding, (5) hand, and (6) the jolly wheel. The physical properties, e.g., specific gravity, specific heat, hardness, thermal expansion, compressive strength, tensile strength, fusion temperature, etc., are given. The fields of application, such as spark plugs, pyrometer tubes, refractories, abrasives, laboratory ware, and artificial gems and bearings, are discussed. See "Impact. . .," *Ceram. Abs.*, **22** [2] 41 (1943). H.E.S.

PATENTS

Ceramic article. A. H. FESSLER AND KARL SCHWARTZWALDER (General Motors Corp.). Can. 408,249, Oct. 27, 1942 (June 29, 1940).—An insulator for spark plugs characterized by high thermal conductivity, capacity, and expansion, high dielectric strength at elevated temperatures, high heat-shock resistance, and good mechanical strength made by firing to a dense, nonporous state a shape formed from a batch consisting of a finely pulverized mixture of 75 to 85 alumina, about 10 to 25 silica, and about 1 to 9% magnesia. G.M.H.

Ceramic body. KARL SCHWARTZWALDER AND A. H. FESSLER (General Motors Corp.). Can. 408,250, Oct. 27, 1942 (June 29, 1940).—An insulator for spark plugs is made by sintering into a dense, nonporous article a shape consisting of a mixture of 65 to 98 alumina, 1 to 30 zircon, and 1 to 33% talc or their equivalents. G.M.H.

Ceramic body and method of making. KARL SCHWARTZWALDER AND A. H. FESSLER (General Motors Corp.). U. S. 2,308,115, Jan. 12, 1943 (April 23, 1940).—Ceramic material especially adapted for use as an insulator for spark plugs, etc., characterized by high dielectric strength at both low and elevated temperatures, high mechanical strength, good resistance to heat shock, and good thermal conductivity, formed by compressing into the desired shape a finely pulverized mixture showing upon chemical analysis a content consisting of approximately 65 to 98 aluminum oxide, 0.6 to 21 zirconium oxide, 0.5 to 31 silicon dioxide, and 0.3 to 11% alkaline-earth flux and sintering the shape into a dense, nonporous article.

Ceramic composition and article made therefrom. T. G. MCDOUGAL AND KARL SCHWARTZWALDER (General Motors Corp.). U. S. 2,308,092, Jan. 12, 1943 (June 29, 1939).—A ceramic composition consisting of a dense stable nonporous sintered mass showing upon chemical analysis 1 to 25% silica, 0 to 15% magnesia, and the remainder beryllia.

Insulating bushing. A. J. A. PETERSON, J. H. FRAKES, AND G. A. BURR (Westinghouse Electric & Mfg. Co.). U. S. 2,308,022, Jan. 12, 1943 (July 19, 1940).

Insulator testing. J. H. FRAKES (Westinghouse Electric & Mfg. Co.). U. S. 2,307,499, Jan. 5, 1943 (April 11, 1941).

Making electrical resistors. G. E. MEGOW (Allen-Bradley Co.). U. S. 2,307,288, Jan. 5, 1943 (April 28, 1937; Oct. 16, 1939); divided out of U. S. 2,096,992, Oct. 26, 1937 (Aug. 1, 1934).—A process of making an electrical resistor comprising the steps of mixing a suitable quantity of gel-adsorbable carbon-bearing compound with a ceramic material containing an adsorbent gel-forming ingredient, converting the gel-forming ingredient to a gel and simultaneously adsorbing the carbon-bearing compound by the gel, forming the mixture into suitable shape, and thereafter heat-treating to yield a resultant electrical conducting product of ceramic material and carbon.

Spark plug. G. M. PAULSON. Can. 407,929, Oct. 13, 1942 (Sept. 3, 1941; in U. S. Nov. 23, 1940). Can. 407,930, Oct. 13, 1942 (Sept. 3, 1941). G.M.H.

Spark plugs. BENDIX AVIATION CORP. Brit. 549,732, Dec. 16, 1942 (July 9, 1940). G. G. BURRELL AND LEO BURRELL. U. S. 2,309,236, Jan. 26, 1943 (Sept. 15, 1941).

Spark plugs and method of making. BENDIX AVIATION CORP. AND F. J. CLEVELAND. Brit. 549,768, Dec. 16, 1942 (May 26, 1941); divided out of Brit. 549,732 (see preceding patent).

Ventilated water closet or toilet. J. G. SCHOTTHOEFER. U. S. 2,309,925, Feb. 2, 1943 (May 3, 1941).

Equipment and Apparatus

Application of guard electrodes in dielectric measurements. E. W. GREENFIELD. *Rev. Sci. Instruments*, **13** [11] 489–92 (1942).—Guard electrodes enable accurate dielectric measurements to be made on small samples of insulating material. They are generally applied to the electrode system of the material for the measurement of (1) insulating resistance, (2) dielectric constant, and (3) power factor. G. gives a brief survey of the technique and application of guard electrodes derived from a background of considerable experience in the dielectric field. H.E.S.

Dewatering ceramic masses in small plants. J. G. *Keram. Rundschau*, **46** [38] 446–47 (1938).—The operation of the filter press is described together with that of a settling and evaporating installation to be used where the former is not practicable. See "Small . . .," *Ceram. Abs.*, **16** [2] 70 (1937). M.V.C.

Electromagnetic sound generator for producing intense high-frequency sound. HILLARY W. ST. CLAIR. *Rev. Sci. Instruments*, **12** [5] 250–56 (1941).—One of the results of the experimental work on the flocculation and removal of suspended particles in smoke and fogs by means of high-frequency sound is the development of the electromagnetic generator. The vibrating element of the generator consists of a solid cylinder of Duralumin supported at its midsection and free to vibrate longitudinally as a free bar. It is excited into vibration electromatically in a way similar to that used with a dynamic loud-speaker. There are two essential differences: (1) the loud-speaker cone or diaphragm is replaced by a highly resonant bar; and (2) the current is induced in the moving coil rather than applied directly to it. Mathematical analyses and circuit diagrams are included to explain the functioning of the internal parts of the generator. R.H.B.

Electron microscope. CHARLES J. BURTON, R. BOWLING BARNES, AND T. G. ROCHOW. *Ind. Eng. Chem.*, **34** [12] 1429–36 (1942).—The calibration and the use of the electron microscope at low magnifications are described. Illustrated. F.G.H.

Electron microscope and its uses. R. BOWLING BARNES AND CHARLES J. BURTON. *ASTM Bull.*, No. 116, pp. 34–41 (May, 1942).—The construction and operating principles of an electron microscope are discussed briefly. Possible sources of error and means of eliminating them are mentioned. Fifteen photographs. B.C.R.

Frit furnaces. G. G. *Keram. Rundschau*, **46** [45] 527–28 (1938).—The construction of tank and pot furnaces for frits and the nature of the materials used in them are discussed in detail. M.V.C.

Phosphorescence microscope. E. NEWTON HARVEY AND AURIN M. CHASE. *Rev. Sci. Instruments*, **13** [8] 365–68 (1942).—Four methods of microscopic observation of the phosphorescence of minute structures in cells or cell products or of microcrystals, both organic and inorganic,

are described. The material must be dry or nearly so, and the illumination must be short ultraviolet, such as occurs in condenser discharges in air or in mercury, or the iron arc. Observations on various types of material are described. H.E.S.

Quantity-type rotor for the ultracentrifuge. A. VICTOR MASKET. *Rev. Sci. Instruments*, **12** [5] 277–79 (1941).—M. presents an improved design for fixed-angle quantity-type rotors in which the holes are drilled at 10° to the axis of rotation and the Lusteroid tubes containing the centrifuge are individually sealed by means of tapered plugs. The advantages of this design are (*a*) increased capacity for a given diameter rotor, (*b*) prevention of tube collapse at all speeds, and (*c*) more efficient concentration of materials in solution. Charts illustrating differential sedimentation and concentration of proteins are given. R.H.B.

Roots and powers. W. F. SCHAPHORST. *Chem. Industries*, **51** [3] 382 (1942).—A graphical method, making use of a logarithmic scale, for extracting an odd root or raising a number to an odd power is described. The method is applicable to a number of any magnitude. E.D.M.

Scanning electron microscope. V. K. ZWORYKIN, J. HILLIER, AND R. L. SNYDER. *ASTM Bull.*, No. 117, pp. 15–23 (Aug., 1942).—The conventional electron microscope is suited primarily for the study of objects less than 1 μ in thickness (those transparent to electrons), whereas the scanning microscope investigates the surface of objects opaque to electrons. The construction and mechanism of operation are described in detail. See *Ceram. Abs.*, **21** [11] 241 (1942). B.C.R.

Use of the mechanical multiharmonograph for graphing types of functions and for the solution of pairs of nonlinear simultaneous equations. S. LEROY BROWN AND LISLE L. WHEELER. *Rev. Sci. Instruments*, **13** [11] 493–95 (1942).—Mechanical means are described whereby types of equations may be graphically represented and nonlinear simultaneous equations may be solved. The procedure requires, in each case, that the equation be changed to a trigonometric form by polar transformation. Graphs are shown to illustrate the process. H.E.S.

X-ray high-temperature camera. ALEXANDER DE BRETTEVILLE, JR. *Rev. Sci. Instruments*, **13** [11] 481–83 (1942).—A powder camera is described which was designed for the purpose of taking X-ray photographs through an X-ray diffraction angle of 0 to 45° in a cylindrical camera of 57.3-mm. radius, to temperatures greater than 300°C. The essential features are (1) a concentric heater extending above and below the sample to minimize sharp temperature gradients, (2) easy access to the oven coils if adjustment is necessary, (3) an iron-constantan thermocouple of small dimensions which allows temperatures to be taken close to the sample, and (4) a water-cooled jacket surrounding the oven to avoid heating the film. Rotation of the sample at 1 r.p.m. is provided for. Calibration of the thermocouple and the type of capillaries for high temperatures are described. H.E.S.

PATENTS

Ball mill. J. M. HENDRY. Can. 408,063, Oct. 20, 1942 (June 17, 1941). G.M.H.

Decorating apparatus. C. A. HEYNE (Owens-Illinois Glass Co.). U. S. 2,307,404, Jan. 5, 1943 (March 31, 1941).

Electrical precipitator with automatic dust removal. G. W. PENNEY (Westinghouse Electric & Mfg. Co.). U. S. 2,307,603, Jan. 5, 1943 (Feb. 18, 1942).

Electric furnace. W. G. CLARK (Clarkiron, Inc.). Can. 408,832, Nov. 24, 1942 (Dec. 8, 1941). G.M.H.

Rotary kiln or drier. C. A. SCHNEIDER (Link-Belt Co.). Can. 408,127, Oct. 20, 1942 (May 26, 1941; in U. S. Aug. 3, 1940). G.M.H.

Sand moisture determining apparatus. C. W. STANCLIFFE (Winget, Ltd., assignee of one-half interest). Can. 408,913, Nov. 24, 1942 (May 8, 1939). G.M.H.

Slurry mixer. T. P. CAMP (Canadian Gypsum Co., Ltd.). Can. 408,672, Nov. 17, 1942 (Aug. 21, 1940; in U. S., with United States Gypsum Co. as assignee, Sept. 20, 1939). G.M.H.

Kilns, Furnaces, Fuels, and Combustion

Combustion calculations by graphical methods—natural gas. A. L. NICOLAI. *Combustion*, **13** [8] 38–42 (1942).—Charts are presented by which combustion calculations can be quickly and accurately made for natural-gas fuel. **U. S. coals.** *Ibid.*, [10] 37–42. See *Ceram. Abs.*, **21** [11] 242 (1942). H.E.S.

Converting potter's kilns from wood to briquette firing. G. G. *Keram. Rundschau*, **46** [40] 471–72 (1938).—Alterations required in the construction of wood-fired kilns in converting them to briquette firing are shown in diagrams and discussed. M.V.C.

Critical survey of tunnel-kiln economy. L. BULLIN. *Trans. Brit. Ceram. Soc.*, **41** [9] 217–27 (1942).—B. discusses the tunnel kiln with relation to quality of finished ware, maintenance costs, labor costs, and fuel costs. R.A.H.

Experiment in working a periodic kiln with blast under the fire bars. S. M. IVANOV. *Ogneupory*, **1940**, No. 5–6, pp. 305–12.—The firing of grog products was accelerated by using a blast under the fire bars of a semi-gas furnace. The firing time was shortened to 60 hr., while the consumption of fuel was cut to 17 or 18% of the original figure without lowering the quality of the products. M.V.C.

Fuel-cost chart. W. F. SCHAPHORST. *Chem. Industries*, **51** [3] 381 (1942).—Two nomograms give (1) the relationship between cost of oil per gallon, specific gravity of oil, B.t.u.'s per pound of oil, boiler efficiency with oil, and B.t.u.'s produced for 1 cent's worth of oil and (2) the relation between cost of coal per ton, boiler efficiency with coal, B.t.u.'s per pound of coal, and B.t.u.'s produced for 1 cent's worth of coal. It is thus possible to calculate whether oil or coal will be cheaper. E.D.M.

Fuel economy in the firing of Hoffmann and Belgian kilns. E. ROWDEN, W. NOBLE, AND A. T. GREEN. *Trans. Brit. Ceram. Soc.*, **41** [9] 207–17 (1942).—Hand and mechanical firing, fuel consumption, grade of fuel setting, etc., are discussed. R.A.H.

Monolithic floor of refractory concrete for a tunnel-kiln truck. S. N. VASIL'EV. *Ogneupory*, **1939**, No. 7, pp. 469–72.—The best results in producing a refractory concrete floor for a tunnel-kiln truck were obtained from mixes containing 30% alumina cement. See *Ceram. Abs.*, **18** [4] 109; [11] 300 (1939). M.V.C.

New firing methods reduce fuel costs and give more uniform firing. ANON. *Brick & Clay Record*, **101** [3] 24–25 (1942).—Detailed construction is shown of a rectangular periodic kiln (developed by the Richard C. Remmey Sons Co.) which, when operated in a series, gives a fuel economy equivalent to that of a tunnel kiln. The kiln is oil fired with eight burners and has a capacity of 50,000 9-in. equivalents. B.C.R.

Phase equilibria in hydrocarbon systems. Methane–decane system. H. H. REAMER, R. H. OLDS, B. H. SAGE, AND W. N. LACEY. *Ind. Eng. Chem.*, **34** [12] 1526–31 (1942).—The specific volumes of five mixtures of methane and decane were established at seven temperatures between 100° and 460°F. for pressures up to 10,000 lb. per sq. in. The composition of the gas phase was determined experimentally throughout the heterogeneous region in the same temperature interval. From these primary data, the specific volumes, bubble-point pressures, and dew-point pressures for each of the mixtures, as well as the properties of the coexisting phases, were established. The results serve to extend an earlier study of the same system

with respect to temperature, pressure, and the mole fraction of methane in the mixtures investigated. Illustrated. F.G.H.

Stokers for high-temperature firing. ANON. *Brick & Clay Record*, **101** [1] 38, 40 (1942).—With the installation of stokers on downdraft kilns, the Charles Taylor Sons Co. has effected a fuel savings of 15 to 20%, a reduction in firing time of 2 to 3 days (9 to 11 days now required), and greater uniformity of product. A low-ash, low-volatile, high-fusion West Virginia coal is used. Coking coals proved unsatisfactory because of the formation of "trees" which clogged the tuyères. A manometer in the air duct leading to the firebox indicates when the fires require cleaning. B.C.R.

What's happening inside your kiln? I, Water-smoking. L. R. WHITAKER. *Brick & Clay Record*, **100** [2] 24–26 (1942). **VI.** *Ibid.*, **101** [2] 24–25 (1942).—Draft fans may be used advantageously to provide adequate draft during the water-smoking period; most kilns have sufficient draft after water-smoking has been completed. Sticking of brick may be caused by adherence due to steaming, and the brick show kiln marking not resulting from overfiring, as soft-fired brick exhibit the same indentures. Incorrect setting of brick in the lower courses may prevent the proper circulation of air for water-smoking. **VII.** *Ibid.*, [3] 26, 28.—The use of mechanical draft may produce too rapid a heating rate during the water-smoking period, resulting in many difficulties. A little longer time and more care used in water-smoking will better prepare the center and bottom ware in the kiln to absorb the heat later in the process. The ware will finish in the same length of time with less coal, and it will be better in quality, provided the kiln has been properly constructed. Remedies for correcting improper water-smoking include (1) setting dry ware, (2) using the proper type of setting, (3) avoiding overcrowding of the kiln, (4) using a high bag wall or eliminating it entirely, and (5) operating the kiln under a greater pressure. For Parts **II–V** see *Ceram. Abs.*, **21** [11] 243 (1942). B.C.R.

PATENTS

Kiln. L. L. LADD. U. S. 2,307,322, Jan. 5, 1943 (May 1, 1941).

Producing heat-radiating flames. H. C. WELLER (General Properties Co., Inc.). U. S. 2,308,902, Jan. 19, 1943 (July 25, 1941).—The method of producing a heat-radiating flame for heating material in a relatively long furnace having a roof a substantial distance above the top level of the material which comprises introducing into the furnace for flow between the roof and the level a relatively thin wide first stream of air, introducing into the furnace for flow next below the air stream a relatively thin wide stream of hydrocarbon fuel gas at a velocity substantially less than that of the air stream, introducing into the furnace for flow next below the fuel-gas stream a relatively thin wide second stream of hydrocarbon fuel gas at a velocity substantially less than that of the first fuel-gas stream, and introducing into the furnace for flow next below the second fuel-gas stream a relatively thin wide stream of air, all of the streams being simultaneously introduced to flow in the same direction from one end of the furnace.

Geology

American potash reserves. GEORGE R. MANSFIELD. *Ind. Eng. Chem.*, **34** [12] 1417–21 (1942).—The war finds the U. S. equipped with a well-established potash industry with adequate supplies of raw materials, good methods of production, ample plant capacities, and prices little affected by the disturbed conditions of world trade. Reserves may be grouped in three classes: (*a*) soluble potash salts and brines now in active production, the sylvite and langbeinite beds mined in New Mexico and the brines of Searles Lake, Calif., and of the Salduro area in the Great Salt Lake Desert, Utah; (*b*) carnallite and alunite beds in Utah under investigation for operation with magnesium or aluminum as the principal product but with potash as a co-product; and (*c*) mineral supplies abundant enough for large-scale production but subject to technological advances, development of marketable co-products, etc. (polyhalite, leucite, greensand, and others). The available quantities of materials of the third class are enormous, and by the time supplies of the first two classes are exhausted, conditions may be ripe for their exploitation. In any event, the potash industry in America is more likely to be affected by world conditions after the war than by any lack of raw materials. Illustrated. F.G.H.

Bauxite deposits in Tasmania. ANON. *Chem. Eng. & Mining Rev.*, **34** [404] 246 (1942).—A newly discovered deposit of low-silica bauxite near Ouse is estimated to contain 2 million tons. B.C.R.

Determination of extinction angles in monoclinic pyroxenes and amphiboles. FRANCIS J. TURNER. *Amer. Jour. Sci.*, **240** [8] 571–83 (1942).—The methods of Burri and of Nemoto for determining extinction angles in augites and hornblendes by means of a universal stage are discussed critically. Some modifications of Nemoto's technique are described. B.C.R.

Effect of time and temperature on the density and crushability of flint. D. A. HOLDRIDGE, H. A. NANCARROW, AND MARCUS FRANCIS. *Tech. Paper Brit. Pottery Research Assn.*, Nov., 1938; reprinted in *Trans. Brit. Ceram. Soc.*, **41** [6] 149–64 (1942).—Flints which have not been calcined have a specific gravity of 2.62, differing only slightly from that of α-quartz (2.65) which is the stable low-temperature form of silica crystallizing in the hexagonal system. X-ray examination of the flints indicates that they are crystalline in structure and consist mainly of quartz; the crystals, apart from occasional inclusions, are not large enough to be distinguishable under the microscope, hence the term "cryptocrystalline" as applied to flint. Chemical analysis shows that the purest flints contain nearly 1% water and traces of organic matter. The flints are usually dark in color, feebly translucent, and extremely hard. High-temperature calcination yields a product which is friable, white, and opaque, with a density of about 2.23, and X-ray analysis reveals that the crystalline form of the silica has changed to cristobalite. The changes which occur on heating can be divided into two groups. The loss of water and the general loosening of the compact structure of the material occur at relatively low temperatures. There is a considerable loss of water at about 350°C. At 450°C. the density of the flints has been reduced from 2.62, the original value, to 2.52. Heating to 1100°C. removes the remaining water and reduces the specific gravity to 2.48 without change in the crystalline form of the cold material. Further heating at temperatures of 1150° to 1250°C. causes another appreciable decrease in specific gravity (2.23) coupled with a permanent change in crystalline form, viz., the formation of cristobalite. A picture of the flints as built up of submicroscopic crystals of quartz cemented together by water molecules accounts satisfactorily for the increased friability, change of color, and abnormal specific-gravity change on heating at relatively low temperatures. Further diminutions in specific gravity resulting from heat-treatments are accounted for by the reversible change in crystalline form which occurs in the already loosened structure at 573°C. and by the difference in expansion coefficients of the quartz microcrystals along different crystallographic axes, both of which may cause the formation of interstices of submicroscopic dimensions into which the liquid used in density determinations cannot enter. Evidence clearly suggests that the industrially calcined flint may contain three types: flints A, A′, and B. Flint A is raw flint with a density of about 2.62. Flint A′, with a density of 2.48 to 2.50, still contains silica as microcrystalline quartz but differs from flint A in that water and organic material have been removed with a con-

sequent weakening of structure. Flint A′ results from heating flint A below 1100°C. It crushes with comparative ease. Flint B (density 2.23) is present only in over-calcined flints. It has been converted to cristobalite, and abundant micropores are present. It is obtained by heating flints A or A′ at temperatures above 1150°C. but below the melting temperature. R.A.H.

Leached derivatives of arsenopyrite and chromite. ROLAND BLANCHARD. *Econ. Geol.*, **37** [7] 596–626 (1942).—The minerals arsenopyrite and chromite are unusual genetic associates, but their leached derivatives possess a common characteristic. The arborescent pattern of their limonitic pseudomorphs is of far bolder relief and more uniform persistence than that found in limonitic derivatives of other sulfides or ore minerals. The pseudomorphs are described and illustrated. Analytical data are presented to show the major chemical and mineralogical changes which take place during oxidation and leaching of the two minerals. Because of the widely held belief that chromite is immune to ordinary weathering attack, the question is raised as to the phenomena of chromite leaching in New Caledonia. B.C.R.

Manitoba chromium find. J. P. DE WET. *Can. Mining Jour.*, **63** [11] 721–22 (1942).—A large easily mined deposit of chromite has been found near Bird River in southeastern Manitoba and is being rapidly explored. It is of low grade and because of its iron-chrome ratio is not acceptable to all consumers at the present time. Government metallurgists, however, believe that the metallurgical problem will not be difficult to solve. This huge deposit, which can be made very easily accessible, is close to abundant supplies of hydroelectric energy; thus it is one of the major discoveries of the year. G.M.H.

Mining clay underground. D. HALLERMANN. *Keram. Rundschau*, **46** [29] 324–26 (1938).—H. describes the layout of an underground clay pit planned to utilize the surrounding rock formations most advantageously with minimum drift construction and arranged to provide more working fields and to concentrate underground operations. M.V.C.

Recovering mica from kaolin. BROR NORDBERG. *Rock Products*, **45** [9] 40–43, 45 (1942).—Mica fines are recovered through flotation and tabling. Procedure and equipment are described in detail. B.C.R.

Tungsten: Canadian and world situation. V. L. EARDLEY-WILMOT. *Trans. Can. Inst. Mining & Met.*, **45**, 437–54 (1942).—Several hundred occurrences of tungsten minerals have been found in Canada as the result of intensive search during the past 18 months. Scheelite is being recovered as a by-product in the mining of gold-quartz veins in Ontario and Quebec. There is a small production in Nova Scotia, where scheelite usually occurs in quartz veins in or near folds in slate. Many scheelite-bearing veins are known in the Yellowknife-Gilmour Lake area of the Northwest Territories. Several discoveries have been made in British Columbia; the Red Rose Mine near Hazelton is the present largest Canadian producer, and the Emerald Mine near Salmo is the outstanding discovery to date and is being prepared for production. The fluorescence of scheelite under the rays of the ultraviolet lamp is of immense value in prospecting, and the lamp has been responsible for nearly all of the recent finds on this continent. Improvements in treatment methods have made practicable the treatment of ores containing as low as 0.2% WO_3. There is only one Canadian consumer of scheelite. Ferrotungsten and scheelite are imported mainly from New Zealand, Mexico, and Portugal. U. S. production is growing rapidly, but domestic requirements are not yet satisfied. As Canada's 1942 production will probably be but a small part of the country's requirements and as the U. S. also is not yet self-sufficient, every effort must be made to find new sources of supply and to conserve available supplies. G.M.H.

SEPARATE PUBLICATION

Decolorizing Clays and Their Activation. YVONNE E. STOURDZÉ. Published by Ministério do Trabalho, Indústria e Comércio, Instituto Nacional de Tecnologia, Rio de Janeiro, 1941. 102 pp. *Rev. Brasil. Quím.* (*Ciencia e Ind.*), **14** [79] 23–28 (July, 1942); reviewed in *Chem. Industries*, **51** [6] 758 (1942).—S. discusses the acidity of decolorizing clays, manipulation, the refining of oils with acids and alkalis before clarification, and the measurement of the decolorizing power of a given clay. The physical and chemical tests applied to natural and activated clays in the U. S. are described. The decolorizing power of São Paulo clays and the properties of clays from other sections of Brazil are discussed. E.D.M.

PATENTS

Chromium-ore concentration and treatment. G. F. ALEXANDER. Can. 407,474, Sept. 22, 1942 (June 16, 1937). G.M.H.

Flotation of quartz and other acidic minerals. S. A. FALCONER AND S. E. ERICKSON (American Cyanamid Co.). U. S. 2,307,397, Jan. 5, 1943 (April 27, 1940).

Modified clay. B. W. ROWLAND (Edgar Bros. Co.). U. S. 2,307,239, Jan. 5, 1943 (Sept. 26, 1939).—In a method of treating Georgia kaolin clay to produce a material adapted for use in or on paper, the steps comprising increasing the ink receptivity and reducing the gloss of the clay by heating it to a temperature of at least about 600°C. and not higher than about 1200°C. and treating the product of the heat-treatment to reduce it to a particle size of a fineness adapted for coating paper to produce a coated surface susceptible of being calendered to a smoothness of at least about 300 Bekk.

Processing dolomite. AMERICAN ZINC, LEAD & SMELTING CO. Brit. 548,930, Nov. 11, 1942 (Aug. 3, 1940).

Chemistry and Physics

Accurate determination of calcium without reprecipitation in the presence of aluminum, iron, magnesium, manganese, phosphorus, sodium, and titanium. WILBUR H. MCCOMAS, JR., AND WILLIAM RIEMAN III. *Ind. Eng. Chem., Anal. Ed.*, **14** [12] 929–31 (1942).—A rapid and accurate method for the determination of calcium is described. The effect of seven elements commonly associated with calcium on the accuracy of this method was investigated. The method is recommended for limestone and similar material but not for sand or other substances very low in calcium. F.G.H.

Agar-agar as a coagulant for barium sulfate. EDGAR J. BOGAN AND HARVEY V. MOYER. *Ind. Eng. Chem., Anal. Ed.*, **14** [11] 849–50 (1942).—The precipitate of barium sulfate in the determination of sulfate usually consists of very fine particles. Standard procedures recommend digestion for several hours, preferably overnight, in the hot solution before filtration. Numerous methods have been proposed to improve the character of the precipitate. It has been found that positively charged barium sulfate, which is obtained when sulfate is precipitated by an excess of barium ions, can be coagulated by the addition of a trace of agar-agar. Approximately 1 mgm. of agar-agar will cause the flocculation of an ordinary analytical precipitate of barium sulfate obtained in the determination of sulfate. On the other hand, negatively charged barium sulfate obtained in the determination of barium is not appreciably improved by the addition of agar-agar. This precipitate, however, usually causes little difficulty in filtration. Another troublesome property of finely divided barium sulfate is its tendency to creep up the sides of the funnel or filtering crucible. Creeping seems to be completely eliminated from precipitates coagulated with agar-agar. Illustrated. F.G.H.

Binary system $CaSiO_3$–diopside and the relation between $CaSiO_3$ and akermanite. J. F. SCHAIRER AND

N. L. BOWEN. *Amer. Jour. Sci.*, **240** [10] 725–42 (1942).—The equilibrium relations between $CaSiO_3$ and diopside and between $CaSiO_3$ and akermanite were studied. Data from quenching experiments are recorded, and the results are presented in phase diagrams. The bearing of these results on the chemical compositions of certain rock-forming minerals and on their mutual melting and stability relations is discussed briefly. B.C.R.

Color reactions of 1,10-phenanthroline derivatives. M. L. MOSS WITH M. G. MELLON AND G. FREDERICK SMITH. *Ind. Eng. Chem., Anal. Ed.*, **14** [12] 931–33 (1942).—A spectrophotometric study of the ferrous complexes of five derivatives of 1,10-phenanthroline indicates that these compounds may be used successfully as color-forming reagents for the determination of iron. Advantages over several methods in use include sensitivity and freedom from pH effects. With the exception of the methyl derivative, they do not form complexes of exceptional stability and are not preferred over the parent compound. 1,10-Phenanthroline and its derivatives form insoluble highly colored cuprous complexes which can be measured colorimetrically in the presence of suitable solvents. These reagents are not satisfactory precipitants for copper. Molybdate ion in the presence of 1,10-phenanthroline or its derivatives may be reduced with chlorostannous acid to give a reddish hue capable of detecting 0.5 p.p.m. of molybdenum. The color is not sufficiently stable for quantitative purposes. Illustrated. F.G.H.

Colorimetric determination of cobalt. R. J. DEGRAY AND E. P. RITTERSHAUSEN. *Ind. Eng. Chem., Anal. Ed.*, **14** [11] 858–59 (1942).—The ammoniacal ferricyanide method for cobalt is modified to control the nature and concentrations of salts present and to permit a precision of 0.06 mgm. of cobalt without careful measurement of the volumes of reagents. Illustrated. F.G.H.

Colorimetric determination of iron with 2,2′-bipyridyl and with 2,2′,2″-terpyridyl. M. L. MOSS WITH M. G. MELLON. *Ind. Eng. Chem., Anal. Ed.*, **14** [11] 862–63 (1942); see *Ceram. Abs.*, **21** [1] 26 (1942). F.G.H.

Determination of antimony by means of titanous sulfate. H. HOLNESS AND G. CORNISH. *Analyst*, **67** [796] 221–23 (1942).—A method for determining antimony (up to 0.4%) volumetrically with titanous sulfate, using indigo carmine, safranine, phenosafranine, or brilliant cresyl blue as indicator, is described. B.C.R.

Determination of copper with 8-quinolinecarboxylic acid. JAMES R. GILBREATH AND HELMUT M. HAENDLER. *Ind. Eng. Chem., Anal. Ed.*, **14** [11] 866–67 (1942).—8-Quinolinecarboxylic acid was found to be suitable as an analytical reagent for the determination of copper in dilute acetic acid solution. The method has an accuracy of about 0.1%. Copper can also be determined rapidly in the presence of an appreciable amount of cadmium or zinc with an accuracy of about 0.15%. An entire determination involves only about 30 man-minutes. The results obtained by these methods are as satisfactory as those of other suggested organic methods, especially those involving quinaldinic acid. 8-Quinolinecarboxylic acid should be less expensive to prepare than quinaldinic acid. F.G.H.

Determination of the elastic constants of beta-quartz. E. W. KAMMER AND J. V. ATANASOFF. *Phys. Rev.*, **62** [7–8] 395–400 (1942).—A new technique for quickly locating and measuring weak resonance points of a plate of piezoelectric material is described. The method involves driving the resonator with a frequency-modulated carrier and demodulating and amplifying a voltage related to the motion of the resonator. The output of the amplifier is placed on one set of plates of an oscilloscope, and the other plates are charged with the modulating voltage. The resulting pattern on the oscilloscope screen permits easy location and measurement of resonant frequencies. This arrangement was employed with a dynamical method to determine all elastic constants of beta-quartz. Edge effects were eliminated by the use of high harmonics. Several hundred frequencies related to six modes of four cuts were measured, this number of modes being sufficient to permit the simultaneous solution of the resulting secular equations with an overdetermination of the five elastic constants. A table gives the values obtained for these constants and all the known results of other experimenters. G.A.K.

Determination of low concentrations of oxygen in gas. JOSEPH A. SHAW. *Ind. Eng. Chem., Anal. Ed.*, **14** [11] 891–92 (1942).—S. describes a method for determining, in gases, concentrations of oxygen as low as several thousandths of 1%. A special type of flask is used. The other equipment and chemicals are found in most chemical laboratories. About 2 hr. are required to obtain results, but during most of this period no personal attention is needed. Compared with previously published methods, this procedure is an improvement with respect to accuracy, delicacy, and facility of manipulation. It is especially adapted to the analysis of gases containing highly unsaturated or easily condensable hydrocarbons. F.G.H.

Determination of pyrophosphate by precipitation with cadmium and polarographic measurement of cadmium in the precipitate. GUNTHER COHN AND I. M. KOLTHOFF. *Ind. Eng. Chem., Anal. Ed.*, **14** [11] 886–90 (1942).—A method is described for the quantitative precipitation of pyrophosphate as cadmium pyrophosphate. After being filtered and washed, the precipitate can be weighed in the anhydrous form when dried to constant weight at 250°C. In general, it is simpler and more practical to dissolve the precipitate in dilute hydrochloric acid and to determine the cadmium polarographically. A procedure is given for the determination of 0.002 to 0.01 *M* pyrophosphate solutions in the presence of 4 to 16 times the molar concentration of orthophosphate and 8 to 32 times the molar concentration of calcium. F.G.H.

Determination of silica in silumins and aluminum containing appreciable silica. K. A. VASIL'EV AND S. YA. GETSOVA. *Zavodskaya Lab.*, **9** [10] 1087–89 (1940); *Khim. Referat. Zhur.*, **4** [4] 74 (1941).—The authors made use of the Fuchshuber method of acid decomposition of the sample, followed by the oxidation of Si to SiO_2 with H_3PO_4 (*Z. Anal. Chem.*, **116** [11–12] 421 (1939)). The dehydration of SiO_2 is replaced by the addition of gelatin to the solution; a 0.5- to 1.0-gm. sample is decomposed with 25 to 40 ml. acid made up of H_3PO_4 (1.7) 50 ml., HNO_3 (1.4) 40 ml., and H_2SO_4 (1.84) 10 ml. After the reaction quiets down, the liquid is gradually vaporized, the temperature being slowly raised to 250°; the Si is thereby oxidized to SiO_2. To the hot mass containing S, 0.5 to 1.0 gm. NH_4NO_3 is added. After the evolution of N oxides ceases, the residue is dissolved in 40 ml. HCl (1:1); 1 gm. NH_4Cl is added to the solution, and the whole is boiled for several minutes. To the solution are then added 10 ml. of a 1% solution of gelatin, and the whole is allowed to stand for 5 to 10 min. Then 250 ml. of hot water are added, and the solution is heated for 5 min. to hasten sedimentation and filtered. The precipitated SiO_2 is washed with hot water, ashed, and ignited in a Pt crucible to constant weight. The purity of the precipitate is checked with HF and H_2SO_4. See *Ceram. Abs.*, **17** [1] 43 (1938). M.Ho.

Electroanalytical precipitation of cobalt. A. B. SHAKHKELDIAN AND A. NOSOVA. *Uchenye Zapiski Saratov. Gosudarst. Univ.*, **15** [4] 76–81 (1940); *Khim. Referat. Zhur.*, **4** [3] 53 (1941).—The authors investigated the excess weight of Co precipitated electrolytically from a solution of $(NH_4)_2C_2O_4$ and from a solution of $NaHSO_3$. Co precipitated from the former solution contained a small amount of C, and that from the latter solution contained mainly sulfides. In the former case the error amounted to 1%, and in the latter it was between +2.1 and +2.7%. To find the error, a method previously described by the authors (*Zhur. Priklad. Khim.*, **2** [4] 467 (1929); **10** [7] 1303 (1937); **11** [4] 692 (1938)) was used. The calculations were made according to the formula $(x + c)/x = A/a$, where x is the amount of Co sought, c is the amount of Co added, A is the weight of the precipitate from the solution containing $(x + c)$ gm. of Co, and a is the weight of the precipitate from the solution containing x gm. of Co. By the use of this method, the

effect of admixtures is greatly diminished. When precipitating Co from $(NH_4)_2C_2O_4$ and $NaHSO_3$ solutions, the error is between −0.2 and +0.4%. M.Ho.

Electroanalytical precipitation of nickel. A. B. SHAKHKELDIAN. *Uchenye Zapiski Saratov. Gosudarst. Univ.*, **15** [4] 82–86 (1940); *Khim. Referat. Zhur.*, **4** [3] 54 (1941).—In precipitating Ni electrolytically from an oxalate solution, the results are too high because of occluded C. To eliminate this error, S. used the addition method (see references in preceding abstract). In precipitating Ni from an oxalate solution by the usual methods, the errors are between +2.7 and +4.4%. This is in agreement with Classen. With the method used by S. the error lies between −0.3 and +0.7%. In determining Ni by the usual method from an oxalate solution containing Cr, the errors are +1.7 to +2.8%. With the method suggested by S., the error does not exceed 0.3%. M.Ho.

Influence of sodium silicate composition on its behavior with sodium carbonate as a casting-slip deflocculant. ARTHUR E. CURRIER. *Jour. Amer. Ceram. Soc.*, **26** [2] 67–71 (1943).—4 figures.

Iodometric determination of iron. N. I. MUZUROV. *Uchenye Zapiski Kazan. Gosudarst. Univ.*, **100** (Book 1) [3] 3–30 (1940); *Khim. Referat. Zhur.*, **4** [3] 51 (1941).—M. reviews the literature on the iodometric and thiosulfate method of determining Fe. Fe can be determined with iodide in the presence of thiosulfate, the latter fixing the I that is formed. The reaction proceeds smoothly in the presence of CuI, which acts as a catalyst. If the solution is acid, it should be neutralized with bicarbonate to incipient hydrolysis of the Fe salt, which is evidenced by the appearance of a yellowish color. The catalyst is then added, followed by 0.1 *N* $Na_2S_2O_3$ containing $1^1/_2$ times its molecular quantity of KI. As the unknown solution contains an excess of KI over $Na_2S_2O_3$, it will be colored until the requisite amount of $Na_2S_2O_3$ is added. A mixture of KI and $Na_2S_2O_3$ is next added to complete the discoloration of the unknown solution. After 5 to 10 min., the $Na_2S_2O_3$ is titrated with a solution of I in the presence of starch. The duration of this determination is 15 to 20 min. The amount of KI used in this method is considerably less than that used in the other methods. Examples of determinations of Fe in Mohr's salt, clay, and iron ore are given. Compared with titration by the Marguerite method, the results are smaller by approximately 0.05%. M.Ho.

Microdetermination of lead by dithizone with an improved lead-bismuth separation. KARL BAMBACH AND ROLAND E. BURKEY. *Ind. Eng. Chem., Anal. Ed.*, **14** [11] 904–907 (1942).—Certain modifications of the photometric dithizone method are discussed. The observance of certain precautions makes it possible to keep standard dithizone solutions for months without apparent deterioration. The time required for carrying out an analysis has been decreased significantly by the development of a lead-bismuth separation which permits the omission of the bismuth test. The complete analytical procedure, including preparation of the samples and purification of all reagents, is given in detail. F.G.H.

Physics of pigments in dispersed systems. HENRY GREEN. *Jour. Applied Physics*, **13** [10] 611–22 (1942).—The industrial rheologist deals with suspensions of particles in vehicles at such high concentrations that particle interaction is inevitable. He must consider particle size and shape, states of aggregation or structure, and systems composed of nonuniform particles and mixed vehicles ranging from Newtonian liquids to highly polymerized pseudoplastics. Such systems are invariably thixotropic. Correlation between microscope studies of pigment structure and the rheological properties is essential. Thousands of different pigments have been produced commercially, but only a limited number are commonly used. Except with carbon blacks, the ultimate particle is a single crystal, but the ultimate working units are hard aggregates of firmly adhering groups of particles functioning rheologically as single particles during the time of their commercial application. Calcined products are likely to be small firm aggregates; fumed products form single crystal particles or twinning aggregations; and precipitated pigments, filtered and dried, are usually a mixture of aggregates and ultimate particles. Particle sizes can be measured with white-light microscopy down to about 0.2 micron. Below 0.1 μ, the electron microscope can resolve and measure particles as small as 0.01 μ. Diffraction errors are not so serious as supposed, because they average out over several hundred measurements. Important average diameters are related to specific surface, arithmetical mean, and number of particles per gram. Particle interaction takes place when the pigment-vehicle ratio produces particle contact. By convection currents, pigment flocculation can occur even though the force of flocculation does not extend much beyond the particle surface. Powders flocculate in vehicles that wet them poorly. By manipulation of the cover glass, it can be determined whether grouping is due to slide-making technique, cemented aggregates, or true flocculation. The flocculates themselves also flocculate, leading to a flocculated structure without any definite flocculate size. Plastic flow can take place only after the definite force of flocculation is countered. Suspensions which are too dense can be prepared for structure studies by covering a drop of the suspension with a larger drop of vehicle and examining the boundary line. Brownian motion is a good criterion for deflocculation. Thixotropic structure is not identical with pigment structure but may be derived from the vehicle. Rotation viscometers are recommended for obtaining consistency curves. Five fundamental types of flow are illustrated by micrographs and corresponding consistency curves: (1) Newtonian, (2) dilatant, (3) pseudoplastic, (4) plastic, and (5) thixotropic. The force of flocculation involves both intensity and capacity. Wetting controls the intensity factor, and the capacity factor depends upon the specific surface of the pigment and on the pigment-vehicle ratio. The plastic viscosity of the pigment-vehicle suspension is always greater than the viscosity of the vehicle, and it is increased by increasing the pigment content, decreasing the particle size, and lowering the wettability of the pigment. A.P.

Polarigraphic determination of titanium. A. M. ZAN'KO, B. A. GELLER, AND A. D. NIKITIN. *Zavodskaya Lab.*, **9** [9] 976–79 (1940); *Khim. Referat. Zhur.*, **4** [3] 52 (1941).—Small amounts (0.1 to 0.5%) of Ti can be determined polarigraphically in the presence of large quantities of Fe and Al (50 to 90%). The determination should be conducted at an acidity not less than 0.05 *N* in the presence of tartaric or citric acid. Fe^{+++} and O interfere. The former is changed to the divalent form by shaking it with the Hg of the anode for 5 to 10 min. Simultaneously, the O is completely removed from the solution by reaction with the reduced Fe. For the analysis of kaolin, 0.3 gm. is treated with H_2SO_4 + HF, and the insoluble residue is fused with potassium pyrosulfate. The fusion is dissolved in the first filtrate, a little iron sulfate is added to it, and the volume is made to 50 cc. Ten milliliters are taken into the electrolyzer, N is passed for 5 min., 0.5 gm. of tartaric acid is added, and the solution is analyzed. An alternate method consists in dissolving the sample in HCl, igniting the insoluble residue, treating it with HF, and fusing with potassium pyrosulfate. The fusion is dissolved in the first filtrate, and the analysis is finished as before. The results obtained by this method agree with those obtained gravimetrically and colorimetrically. M.Ho.

Polarigraphic method of determining admixtures of bismuth, lead, nickel, and zinc in metallic copper. S. A. PLETENEV, E. I. DUBOVITSKAYA, AND T. V. AREF'EVA. *Zavodskaya Lab.*, **9** [8] 824–27 (1940); *Khim. Referat. Zhur.*, **4** [3] 55 (1941).—To determine Bi and Pb, dissolve 50 gm. of Cu in HNO_3, add a little $FeCl_3$, and neutralize with NH_4OH, thus precipitating $Fe(OH)_3$ which drags down completely Bi and Pb. Dissolve the precipitate in concentrated HCl, add tartaric acid, NH_4OH (to alkaline reaction), KCN, and Na_2S. Dissolve the precipitated Bi and Pb sulfides in hot 6 *N* HCl, boil to drive off H_2S, and dilute to 50 cc. with 6 *N* HCl. Transfer 10 ml. into the electrolyzer, pass H, and make the polarigraphic deter-

mination. To determine Ni and Zn, dissolve two 5-gm. samples in a mixture of H_2SO_4, HNO_3, and H_2O. Dilute the solutions, add to each 5 gm. of NH_4NO_3, and separate the Cu by electrolysis. After this, electrolyze the solutions with a Pb anode to remove the Cu remaining in solution. Combine the solution, neutralize with NH_4OH, heat, and add Na_2SO_3 and Na_2S. Treat the precipitate with concentrated HNO_3 in the presence of $(NH_4)_2S_2O_8$. Filter, add H_2SO_4 to the filtrate, and heat until the fumes of H_2SO_4 escape. Filter off $PbSO_4$, add 5 ml. of a solution containing 0.1 *N* ammonium acetate and 0.25 *N* KCNS per liter, and make to 50 ml. Transfer 10 ml. into the electrolyzer, pass H, and determine polarigraphically. The time required for determining Bi and Pb is 5.5 hr., and that for Zn and Ni is 10 hr. M.Ho.

Photometric determination of silica in the presence of phosphates. M. C. SCHWARTZ. *Ind. Eng. Chem., Anal. Ed.*, **14** [11] 893–95 (1942).—The most widely used colorimetric method for silica depends upon the formation of a colored silicomolybdic acid. As phosphate ions react similarly, special attention must be given to the determination of silica in the presence of phosphates. The interference of phosphates has been removed by precipitation prior to colorimetric determination: King used a magnesia mixture; Thayer used calcium chloride; Liebknecht, Gerb, and Bauer used calcium chloride and calcium carbonate; King and Stantial used calcium chloride and ammonium hydroxide; and Schwartz used calcium chloride and a sodium borate-sodium hydroxide buffer solution. Precipitation methods for the removal of interfering phosphates are, at best, time-consuming. Another method for avoiding phosphate interference depends upon the effect of pH on the reduction of the phospho- and silico-molybdic acid complexes; with proper pH adjustment, the silicomolybdic acid complex alone is reduced. A recent paper by Kahler illustrates this method. The interference of phosphates, however, is most simply avoided by destroying the phosphomolybdic acid complex with various acids and some of their salts, e.g., oxalic, tartaric, citric, and phosphoric. On the basis of this fundamental information and further experimental work, a procedure was developed for determining silica in the presence of phosphates, using oxalic acid for destroying the interfering colored phosphomolybdic acid. Illustrated. F.G.H.

Potentiometric determination of calcium. F. K. FISHER. *Uchenye Zapiski Saratov. Gosudarst. Univ.*, **15** [4] 94–105 (1940); *Khim. Referat. Zhur.*, **4** [3] 50 (1941).—Ca is precipitated with an excess of $K_4Fe(CN)_6$ in the presence of KCl. The precipitation is done at 75° in a 22% alcoholic neutral solution. The solution is made to a definite volume. In an aliquot of the filtrate, the $K_4Fe(CN)_6$ is potentiometrically titrated with a solution of $ZnSO_4$. The $ZnSO_4$ is standardized potentiometrically against $CaCl_2$, which was standardized by the oxalate method. In standardizing the $ZnSO_4$, the same operations are performed as were used in the titration of the unknown; several weights of $CaCl_2$ are used. The $ZnSO_4$ solution is calculated by the formula $T = (a_n - a_1)/(n_1 - n)$, where a_1 is the amount of Ca in the smaller sample, a_n is the amount of Ca in the larger sample, n_1 is the volume of $ZnSO_4$ solution used in titrating the excess $K_4Fe(CN)_6$ in a_1, and n is the same for a_n. Because the titer of the $K_4Fe(CN)_6$ solution varies, control samples containing a definite amount of Ca are run. The results are then calculated by the formula $x = a_1 + (n_1 - n_2)T$, where x is the weight of Ca sought, a_1 is the known weight of Ca in the control sample, n_1 is the volume of the $ZnSO_4$ solution used for titrating the excess $K_4Fe(CN)_6$ in the control sample, and n_2 is the same for the unknown solution. Where the Ca amounts to 60 to 160 mgm., the deviation of the oxalate method does not exceed ±0.5 mgm. One liter of the solution may contain Ba 350, Sr 200, Mg 100, KNO_3 10, NaCl 10, SO_4^{--} 150, and NH_4^+ 1 gm. This method is particularly suitable for determining Ca in Iceland spar, marble, and cement. M.Ho.

Potentiometric determination of iron in the presence of aluminum and titanium. F. K. FISHER AND V. I. VOLOVITSKIĬ. *Uchenye Zapiski Saratov. Gosudarst. Univ.*, **15** [4] 106–18 (1940); *Khim. Referat. Zhur.*, **4** [3] 53 (1941).—The titration is done with a solution of $CrSO_4$ after oxidizing the Fe. The $CrSO_4$ solution is prepared according to Thornton (*Ind. Eng. Chem., Anal. Ed.*, **4** [2] 240–43 (1932)) as modified by Zan'ko and Shlyakman (*Zavodskaya Lab.*, **3** [9] 777–84 (1934)). The titration is done in an atmosphere of CO_2, at 80°, with constant stirring. The strength of the $CrSO_4$ solution is determined by titrating it potentiometrically with a 0.1 *N* solution of $FeCl_3$ under conditions similar to those of the titration of the unknown. The $FeCl_3$ is standardized gravimetrically, the Fe being precipitated with NH_4OH. To study the effect of other methods, the authors determined Fe in solutions containing Fe 0.0687 and Al up to 0.1, Ti up to 0.1, Ca up to 0.2, Mg up to 0.05, K up to 0.01, and Na up to 0.01 gm. per 100 ml. The deviations from the gravimetric method were ±0.5 gm. This method is applicable for determining Fe in clay, cement, phosphorite, siderite, spherosiderite, and bauxite. M.Ho.

Potentiometric determination of molybdenum. F. K. FISHER AND V. I. LYUBIMTSEV. *Uchenye Zapiski Saratov. Gosudarst. Univ.*, **15** [4] 119–27 (1940); *Khim. Referat. Zhur.*, **4** [3] 53 (1941).—The authors improved the potentiometric titration of Mo with a solution of $SnCl_2$. The $SnCl_2$ solution is checked daily potentiometrically against a solution of ammonium molybdate. The latter is prepared by dissolving molybdic acid heated to 800° in a weak solution of NH_4OH. The titration is conducted in a current of CO_2 at room temperature. The addition of more salt to the titrated solution helps to establish the potential quickly and also causes a sharp change of the potential at the equivalent point. In the determination of Mo in steels containing Cr and V, the addition of more salt is imperative to reduce Cr and V; otherwise, the results will be too high. Before each titration, the Pt electrode should be washed in cleaning solution, boiled in HCl (specific gravity 1.19), and ignited. The presence of chlorides in solution helps to establish the potential quickly. This method was used in determining Mo in Cr-Mo steels. Compared with the gravimetric method, the absolute error is 0.01 to 0.05% when the Mo content of the steel is 0.31%. M.Ho.

Rapid method for detecting some rare earths. S. V. GRUM-GRZHIMAĬLO. *Sovet. Geol.*, **1940**, No. 9, pp. 91–94; *Khim. Referat. Zhur.*, **4** [3] 58 (1941).—G. uses a microscope and puts a spectrum ocular in front of the microscope ocular. The spectrum ocular consists of a pocket spectroscope for direct vision. The presence of rare earths is recognized by their characteristic adsorption spectra. Polished surfaces and thin sections are viewed in direct light. For viewing grains and small pieces of rock, G. uses a sidelight of the universal lamp of the type VIMS. Pr and Nd give distinct lines in the yellow part of the spectrum between 590 and 570 mμ and in the green part around 525 and 510 mμ. The elements of the Ce group give absorption lines in the yellow part of the spectrum. Negative results are not an indication of the absence of rare earths. Examples are given of the determination of rare earths in apatites and other minerals. This method is not applicable when the concentration of the rare earth is less than 0.09%. M.Ho.

Rapid photometric determination of Mg in Al alloys. W. STROSS. *Analyst*, **67** [799] 317–18 (1942).—A method of determining Mg photometrically through the use of titan yellow in a solution having a pH of 12 to 13 is described. B.C.R.

Reactions between dolomite and various minerals: I, Constitution of the fired clinkers. J. R. RAIT AND A. T. GREEN. *Bull. Brit. Refrac. Research Assn.*, No. 56, p. 207 (1940); reprinted in *Iron & Steel Inst. Special Rept.*, No. 28, pp. 13–47 (1942).—Various proportions of dolomite with flint, steatite, bentonite, china clay, olivine, serpentine, open-hearth slag, alumina, ferric oxide, zircon, baddeleyite, zirconia, rutile, chromite, and chromium oxide were molded and fired at about 1500° C

Qualitative tests for free lime in the fired clinkers were made, and quantitative determinations of free lime were carried out on numerous samples. Measurements were made of the index of hydration of the clinkers. From a consideration of relevant phase diagrams, with the assumption of equilibrium state of reaction in the clinkers, the probable constitutions of the fired mixtures were calculated. The results of these calculations were substantiated by (*a*) a comparison of the calculated and experimentally determined free-lime contents, (*b*) the dusting of those clinkers which calculation indicated contained a high percentage of calcium orthosilicate, and (*c*) the form of the curves obtained when the steam-hydration indices were plotted against the percentage of acidic oxides. It was assumed that the magnesia was present as uncombined periclase in all clinkers. With an increasing addition of silica or siliceous minerals, evidence indicated that there was increasing combination of the lime to form tricalcium silicate and, with larger silica contents, dicalcium silicate. When zirconium minerals were added, there was evidence of the formation of $CaO \cdot ZrO_2$, and when chrome minerals were added, of the formation of $2CaO \cdot Cr_2O_3$. **II, X-ray examination of the dolomite B-steatite A series.** J. R. RAIT AND H. J. GOLDSCHMIDT. *Bull. Brit. Refrac. Research Assn.*, No. 56, p. 242 (1940); reprinted in *Iron & Steel Inst. Special Rept.*, No. 28, pp. 49–61 (1942).—X-ray analyses were made of fired dolomite-steatite mixtures containing initially 0 to 15% steatite. Two commercial dolomite brick were also analyzed. Qualitatively and quantitatively, within the limits of accuracy of the photometric measurement of relative intensity of the characteristic lines from the Debye-Scherrer X-ray photographs, the results for the mineralogical constitution of the sinters are in complete accord with those deduced in Part I on the basis of determinations of free lime and consideration of the appropriate thermal-equilibrium diagrams. For the particular dolomite and steatite investigated, the proportion of free lime present in the fired mixtures decreased to nil as the initial steatite content increased to between 8 and 10%. At this composition range there was maximum production of $3CaO \cdot SiO_2$. Further addition of steatite resulted in a decrease in the amount of this constituent and a corresponding increase in the proportion of $2CaO \cdot SiO_2$. The magnesia was present in almost constant amount as uncombined periclase. **III, Further X-ray examinations.** *Bull. Brit. Refrac. Research Assn.*, No. 58, p. 95 (1941); reprinted in *Iron & Steel Inst. Special Rept.*, No. 28, pp. 63–90 (1942).—The procedure and technique of Part II were applied to mixtures of dolomite B with four different steatites and with serpentine, flint, olivine, bentonite, china clay, alumina, and ferric oxide. Mixtures of dolomite A with various proportions of steatite A were also included. The results were in complete accord with the constitutions previously assigned in Part I and confirm the assumptions made regarding certain of the relevant four- and five-component systems. Evidence indicates a close approach to chemical equilibrium in the experimental clinkers and in commercial dolomite products. Results of X-ray analysis and calculated mineralogical compositions of three commercial products are likewise in close agreement. **IV, X-ray examination of the sinters containing zirconia.** *Bull. Brit. Refrac. Research Assn.*, No. 59, p. 124 (1941); reprinted in *Iron & Steel Inst. Special Rept.*, No. 28, pp. 91–99 (1942).—The procedure and technique of Part II were applied to specimens of fired mixtures of dolomite with various proportions of zirconia, synthetic zircon, natural zircon, and baddeleyite. From the Debye-Scherrer powder method photographs obtained, conclusions regarding the constitution of the sinters were made which substantiate those previously made from determinations of uncombined lime, from steam-hydration indices, and from a consideration of available thermal-equilibrium data. It was confirmed that calcium metazirconate was formed by the reaction of zirconia or zircon with the lime. Magnesia remains uncombined as periclase. P.S.D.

Regularity in the field of chemistry of bonding materials. V. F. ZHURAVLEV. *Zhur. Priklad. Khim.*, **13** [8] 1141–46 (1940); *Khim. Referat. Zhur.*, **4** [5] 4 (1941).—To determine whether there exists a regularity between the position of an element in the periodic system and the ability of its oxide to form bonding materials in combination with trivalent metals and SiO_2, Zh. investigated mixtures of CaO, ZnO, SrO, CdO, BaO, and oxides of Cr, Mn, Al, and Fe with SiO_2. The fusion was continued until a monomineral state or a state of a definite phase equilibrium was attained. The products were then tested for their bonding ability. As a result of this investigation and a study of the literature, Zh. draws the following conclusions: (1) The oxides of the alkali earths situated in the even rows of the periodic system do not form, with trivalent metals and SiO_2, compounds having bonding properties. Compounds having such properties are formed only by the oxides of the metals in the odd rows. (2) Alkali-earth silicate, aluminate, etc., compounds form bonding materials only when the radius of the alkali-earth ion exceeds 0.97 a.u. (the radius of Cd^{++}). To possess bonding properties, the above-mentioned compounds must have a sufficiently high basicity, i.e., an excess of basic oxides. See "Binding . . .," *Ceram. Abs.*, **18** [9] 232 (1939). M.Ho.

Simultaneous determination of Zn^{++} and NH_4^+ in solutions of zinc chloride and ammonium chloride by titration with alkali hydroxide. V. M. SHALFEEV AND T. E. DOBROVOL'SKAYA. *Zavodskaya Lab.*, **9** [9] 1035–36 (1940); *Khim. Referat. Zhur.*, **4** [3] 51 (1941).—To 20 ml. of approximately 0.1 *N* solution of $ZnCl_2$ and NH_4Cl, add 10 to 20 ml. of H_2O, a drop of methyl red (0.1%), and a drop of methylene blue (0.05%). Add 0.1 *N* HCl until the green color changes to violet. Add 4 to 5 drops of phenolphthalein and titrate with 0.1 *N* NaOH until the color is gray-blue. This is the end of the Zn titration. Add to the solution 10 ml. of 20% neutralized Formalin and continue the titration until the appearance of bright violet. This is the end point of the NH_4Cl titration. The results obtained by this method coincide with those obtained by the ferrocyanite and formaldehyde method. The determination takes 15 to 20 min. M.Ho.

Spectrophotometric determination of iron with *o*-phenanthroline and with nitro-*o*-phenanthroline. J. P. MEHLIG AND H. R. HULETT. *Ind. Eng. Chem., Anal. Ed.*, **14** [11] 869–71 (1942).—A spectrophotometric method has been developed for the determination of iron in ores which depends upon reducing the iron with hydroxylamine and measuring the light transmittancy, at 490 and 505 mμ, of the colored solution produced by either *o*-phenanthroline or nitro-*o*-phenanthroline. The results agree closely with those obtained by the dichromate titrimetric method. The method is easily carried out and requires no longer, possibly a little less, time than usual titrimetric methods. Very few diverse ions interfere with the color, and a wide range in pH values is possible. An alternate procedure for reducing the iron with stannous chloride is not recommended. F.G.H.

Spectrophotometric determination of magnesium by Titan yellow. E. E. LUDWIG AND C. R. JOHNSON. *Ind. Eng. Chem., Anal. Ed.*, **14** [11] 895–97 (1942).—Various natural and treated waters and concentrated magnesium solutions may be analyzed rapidly and accurately for magnesium by a spectrophotometric adaptation of Kolthoff's Titan yellow method. For most practical purposes, the interferences likely to be encountered do not appreciably affect the results. The procedure is recommended for control use. F.G.H.

System CaO–SiO_2–P_2O_5. RICHARD L. BARRETT AND WILLIAM J. MCCAUGHEY. *Amer. Mineralogist*, **27**, 680–95 (1942).—The system contains, in addition to the binary phases previously described in the literature, two ternary phases, nagelschmidtite and silicocarnotite, which have been known as constituents of certain slags. The equilibrium diagram presents some features of special interest. The field of cristobalite is very large. There is an extensive region of liquid immiscibility in which two liquids in equilibrium with cristobalite are formed. Ex-

tensive solid solution prevails in the four phases, calcium orthosilicate, nagelschmidtite, silicocarnotite, and tricalcium phosphate, which form a binary system with the first and last as end members. Calcium orthosilicate may contain up to 10% P_2O_5 in solid solution, and nagelschmidtite, the formula for which may be expressed as $Ca_7Si_2P_2O_{16}$, can have a P_2O_5 content varying from 12 to 24%. The solid solution seems to be of the substitution type, with PO_4 replacing SiO_4 groups. In both phases, refractive indices decrease as the P_2O_5 content increases. W.D.F.

System $CaSiO_3$–diopside–anorthite. E. F. OSBORNE. *Amer. Jour. Sci.*, **240** [11] 751–88 (1942).—The plane $CaSiO_3$–diopside–anorthite occupies an important position within that part of the quaternary system CaO–MgO–SiO_2–Al_2O_3. New data are presented for compositions lying in this plane, and the phase relations are discussed with the aid of a series of diagrams. A ternary reaction point is present at 1245°C., and the lowest temperature at which liquid exists in the system under equilibrium conditions is 1236°C. The alleged compound $5CaO \cdot 2MgO \cdot 6SiO_2$ does not appear in the system as formerly believed. Data are presented supporting the evidence of Schairer and Bowen that this compound does not exist. The crystals of diopside appearing in the system are slightly aluminous; consequently, the system is not completely ternary. Some additional data are presented for the limiting systems $CaSiO_3$–anorthite and diopside–anorthite. B.C.R.

Thermal conductivity of nonmetallic single crystals. W. J. KNAPP. *Jour. Amer. Ceram. Soc.*, **26** [2] 48–55 (1943).—9 references, 11 figures.

Use of phosphate for separation of cobalt from iron. VICTOR NORTH AND ROGER C. WELLS. *Ind. Eng. Chem., Anal. Ed.*, **14** [11] 859–60 (1942).—The well-known tendency of cobalt to be retained by the iron-alumina precipitate produced by ammonia has generally been ascribed to a specific adsorption by the large surface of this gelatinous precipitate. Whatever its cause, it can be overcome by precipitating the iron as phosphate at a pH of 3.5. The precipitate is easily filterable, and practically all of the cobalt passes into the filtrate. F.G.H.

Use of phosphoric acid for the analysis of minerals and rocks. A. V. SHEĬN AND M. V. MIL'KOVSKAYA. *Zavodskaya Lab.*, **9** [9] 979–82 (1940); *Khim. Referat. Zhur.*, **4** [3] 58 (1941).—The authors developed a method for the analysis of chromites, manganese ore, and ferromanganese, using H_3PO_4 for decomposition of the material. For the analysis of chromite, add 0.5 gm. of the sample to a mixture of 10 to 15 ml. of 1.7 H_3PO_4 and 5 to 10 ml. of H_2SO_4 and heat to complete decomposition. In the resulting solution, reduce the Fe with $SnCl_2$ and titrate with $K_2Cr_2O_7$. Oxidize the Cr with persulfate and titrate with Mohr's salt. Oxidize the V with $KMnO_4$ and titrate with Mohr's salt. For the analysis of manganese ore, treat a 0.1- to 0.5-gm. sample with 15 to 20 ml. of H_3PO_4(1.7) at 350°, stirring it frequently. In the resulting solution, oxidize the Mn with persulfate in the presence of Na formate and $AgNO_3$. Titrate with Mohr's salt, using toward the end Ba diphenylaminosulfonate as indicator. The Na formate prevents the separation of MnO_2. To determine Mn, Cr, and V when they are present together, decompose the sample with H_3PO_4, dilute with water, treat with persulfate in the presence of $AgNO_3$ and Na formate, and titrate the sum of these with Mohr's salt. Again oxidize with persulfate, reduce Mn with NaCl, and titrate Cr + V as before. Oxidize V with $KMnO_4$, decompose the excess of the latter with nitrite and urea, and titrate V as before. M.Ho.

PATENTS

Barium sulfate manufacture. L. T. WORK AND HUGH ALLESSANDRONI. Can. 408,315, Nov. 3, 1942 (Jan. 30, 1936). G.M.H.

Beryllium oxide or hydroxide process. R. H. MCKEE. Can. 407,922, Oct. 13, 1942 (Nov. 3, 1939). G.M.H.

Production of TiO_2 pigments. J. L. KEATS (E. I. du Pont de Nemours & Co.). U. S. 2,307,048, Jan. 5, 1943 (Sept. 15, 1939).—A process for producing a titanium oxide pigment exhibiting substantially the X-ray diffraction pattern of rutile comprising subjecting a washed TiO_2 hydrolysis precipitate to calcination in the presence of a small amount of an added lithium salt.

Titanium dioxide composite pigment. W. W. PLECHNER AND H. V. ALLESSANDRONI (Canadian Titanium Pigments, Ltd.). Can. 407,532, Sept. 22, 1942 (June 13, 1939). G.M.H.

Titanium dioxide pigment dispersion. R. W. ANCRUM AND A. G. OPPEGAARD (Canadian Titanium Pigments, Ltd.). Can. 407,531, Sept. 22, 1942 (Sept. 9, 1938). G.M.H.

Titanium pigment. J. E. BOOGE (Canadian Industries, Ltd.). Can. 407,512, Sept. 22, 1942 (June 14, 1939). M. L. HANAHAN AND R. M. MCKINNEY (Canadian Industries, Ltd.). Can. 407,510, Sept. 22, 1942 (Aug. 12, 1938). R. M. MCKINNEY (Canadian Industries, Ltd.). Can. 407,511, Sept. 22, 1942 (April 8, 1939). G.M.H.

Titanium-pigment production. M. L. HANAHAN AND R. M. MCKINNEY (E. I. du Pont de Nemours & Co.). Can. 407,548, Sept. 22, 1942 (April 22, 1938). G. D. PATTERSON (E. I. du Pont de Nemours & Co.). Can. 407,549, Sept. 22, 1942 (April 22, 1938). G.M.H.

Zirconium oxide preparation. C. J. KINZIE, R. P. EASTON, AND V. V. EFIMOFF (Titanium Alloy Mfg. Co.). Can. 407,583, Sept. 22, 1942 (Nov. 9, 1940; in U. S. Dec. 8, 1939). G.M.H.

General

Analyzing working environment. E. C. BARNES. *Westinghouse Safety News*, Sept., 1942; *Ind. Med.*, **11**, 603 (Dec., 1942).—B. indicates some results of vigilance at the Westinghouse Electric & Mfg. Co. since its Industrial Hygiene Laboratory was opened in 1933. The first work undertaken was the determination of dust in shop operations having exposure to silica dust. New electrostatic dust- and fume-sampler methods developed in this laboratory are now used by industrial laboratories throughout the country. The reduction of dust concentrations has greatly lowered the potential dust hazard. Present conditions of increased production, however, tend to obscure dust effects which are not evident immediately. In one plant dust samples and concentrations are being attentively considered to prevent the development of a possible hazard. During the first half of 1942, 36 workers were tested for lead exposures above normal. Solvents such as benzol, which speed up processes and make better products, increase in toxicity with volatility. Exposures to benzol can be estimated by measuring the vapor present in the air and by determining the increase of organic sulfates in the urine of exposed workers. K.R.

Automatic control of natural-gas-fired power boilers. CHARLES W. PARSONS. *Combustion*, **13** [10] 43–46 (1942).—P. reviews some of the more common arrangements of control equipment to maintain constant steam pressure, sustain maximum combustion efficiency, and promote safety in the burning of natural gas. Each point is discussed. H.E.S.

Carelessness is akin to sabotage. HARRY K. JACKSON. *Better Enameling*, **13** [11] 14–16 (1942).—The increase in the industrial accident rate is due to such factors as overcrowding, improper power and heating systems, inadequate supervision, and management's attitude of production at all costs. Accident distribution pertaining to different parts of the body was as follows: eyes 4, head (except eyes) 7, arms 8, fingers 22, trunk 20, legs 13, feet 8, toes 5, and general 4%. Surveys made by two large insurance companies showed that 75% of all industrial accidents were directly the fault of the workman. B.C.R.

Ceramic industry in Sudeten Germany. ANON. *Keram. Rundschau*, **46** [44] 515–18 (1938).—The state of the ceramic industry in Sudetenland and its organization, output, and raw materials at the time of its return to Germany are discussed. M.V.C.

Comparison of methods for the determination of CO. F. H. GOLDMAN AND A. D. BRANDT. *Amer. Jour. Pub. Health*, **32** [5] 475–80 (1942).—The following methods for determining CO were compared: Hoolamite detector, palladium chloride ampoules, British palladium chloride method, Hopcalite indicator, iodine pentoxide, and pyrotannic acid. The results indicated that, if the time factor is considered, the Hopcalite indicator is the best, although in concentrations of 0.01 to 0.1% CO, the British palladium chloride method gave good results. The Hoolamite detector was considered the least satisfactory of all. Details of test procedures are given. B.C.R.

Control and collection of industrial dust: III. E. D. POWERS. *Rock Products*, **45** [9] 48–49, 51 (1942).—Recent developments in high-efficiency cyclones and the selection of the proper type are discussed. For Parts I and II see *Ceram. Abs.*, **21** [8] 175 (1942). B.C.R.

Correct power-station lubrication not based on rules of thumb. HOWARD COOPER. *Combustion*, **13** [7] 30–32 (1942).—C. reviews the principles underlying the lubrication of power-plant equipment and the various conditions that must be investigated by the lubrication engineer before prescribing the correct oil for the individual case. H.E.S.

Dust diseases. ANON. *Chem. Eng. & Mining Rev.*, **34** [405] 275–77 (1942).—The most frequent types of dust diseases, chemical and physical characteristics of dusts, and means of dust control are considered. B.C.R.

Dust problems in burning blast-furnace gas under steam boilers. A. R. MUMFORD. *Combustion*, **13** [11] 35–37 (1942).—A survey of a number of installations indicates that dirty gas, when not supplemented with other fuels, is satisfactory for burning under boilers, even with refractory settings. When supplementary fuel, such as oil or pulverized coal, is employed, the higher resulting gas temperature may cause the dust to fuse and produce slagging on the heating surfaces. In such cases, segregation of the burning zones is desirable. The cost of boiler cleaning, however, is usually much less than that of subjecting the gas to primary washing and appears to justify the use of dirty gas. H.E.S.

Grate temperatures a measure of ignition penetration. WALTER H. WOOD. *Combustion*, **13** [8] 31–32 (1942).—When the rate of ignition penetration of a stoker fuel bed is known, it is possible to apply air for combustion most effectively in each zone. A convenient means of ascertaining the ignition penetration is through the measurement of grate temperatures by means of thermocouples. Directions for their installation and use are given. H.E.S.

Guide for inventors. L. T. PARKER. *Combustion*, **13** [10] 47–49 (1942).—P. presents facts for engineers who contemplate applying for a patent. He points out the things that are and are not patentable and the various factors that govern patentability. Commonplace examples are cited, and each point is verified by reference to reports of higher court decisions as listed in the bibliography. H.E.S.

Importance of invention to the nation. H. A. TOULMIN, JR. *Chem. Industries*, **51** [6] 696–99 (1942).—The American and European patent systems are compared. The following points are discussed: economic importance of inventions, economics of inventions, results of inventions, public policy behind patents, England and colonial inventions, economic justification for patents, and patent rewards. T. attributes America's great industrial and economic development to her unique patent system. E.D.M.

Increased steel-mill production by protective lubrication. ANON. *Lubrication*, **28** [7] 73–84 (1942).—The Texas Co., New York, N. Y., has enhanced the usefulness and met the demands of the modern steel mill's production line by providing protective lubrication. Factors which promote effective maintenance and methods of extending the useful life of steel-production machinery are discussed. H.E.S.

Is acute lobar pneumonia a complication of silicosis? D. C. PIERPONT. *Jour. Ind. Hyg. & Toxicol.*, **24**, 238–39 (Oct., 1942).—P. investigated the incidence and mortality rate of acute lobar pneumonia in the northern counties of Michigan and Wisconsin where iron mining is the chief industry. No incidence rates of value could be obtained, but mortality tabulations from these counties showed lower rates than those occurring in the U. S. as a whole. In the Gogebic range in Gogebic County, Mich., and in Iron County, Wis., mortality rates for underground workers are practically the same as for surface workers of the same age. In the iron-ore mines of the Upper Peninsula, 20 years of underground work were required for silicotic nodules to become large enough to be seen on an X-ray film, and miners with silicosis who contracted pneumonia did as well as those with no silicosis. Workers with advanced silicosis often recovered from the pneumonia without any specific treatment. The 18 pneumonia deaths occurring among 6000 employees of the mining companies during a 4-year period would give a yearly mortality of 65 per 100,000, which is the same as that for policemen, who have no silicosis. P. concludes that acute lobar pneumonia is an infectious, communicable disease but not an industrial disease. K.R.

Low draft loss flue-dust collectors at Conners Creek powerhouse. H. E. MACOMBER. *Combustion*, **14** [4] 30–35 (1942).—M. describes the development work leading up to the present design of wedge-type flue-dust collector, operating on the Van Tongeren principle, which is installed on five of the stoker-fired boilers. Test results are included. H.E.S.

Modern turbine developments. J. R. CARLSON. *Combustion*, **13** [9] 43–48 (1942).—C. reviews the progress in steam-turbine design as closely related to advances in metallurgy, discusses creep, shows how expansion is compensated, explains blade resonance, describes means for handling the problem of moisture and blade erosion in the low-pressure stages, and illustrates how cyclic vibrations of the generator are overcome. H.E.S.

1825-lb. pressure topping unit with special reference to forced-circulation boiler. F. S. CLARK, F. H. ROSENCRANTS, AND W. H. ARMACOST. *Combustion*, **14** [6] 32–38 (1942).—A general consideration and certain design details are presented of the new high-pressure C-E Controlled Force-Circulation steam-generating unit which is nearly double the capacity of any installed abroad. Recent operating and performance data are also included. H.E.S.

Pennsylvania post-graduate course in industrial medicine and hygiene. ANON. *Ind. Med.*, **11**, 604 (Dec., 1942).—During January and February an advanced course in industrial medicine and hygiene is being presented in Philadelphia under the auspices of committees of county and state medical societies. The February sessions are devoted to dust hazards (minor organic and inorganic), to silica and the silicates, including asbestosis and silicosis, and to pottery-making as a siliceous occupation. K.R.

PATENTS

Artificial stone making method. P. W. JONES AND J. W. SWEZEY (Rostone Corp.). Can. 409,055, Dec. 1, 1942 (May 29, 1939).—A method of producing synthetic stone comprises mixing finely divided anhydrous aluminosilicate material, aluminosilicic acid material, and an alkaline-earth base, wetting thoroughly with water, forming, and subjecting to a moist heat. G.M.H.

Synthetic ore. H. M. KRANER (Bethlehem Steel Co.). U. S. 2,308,984, Jan. 19, 1943 (June 14, 1941).—A synthetic ore comprising fine iron oxide containing material substantially free of silica and carbon intimately mixed with limestone to aid in fusion and fused and cast in molds as desired.

THE BULLETIN SECTION

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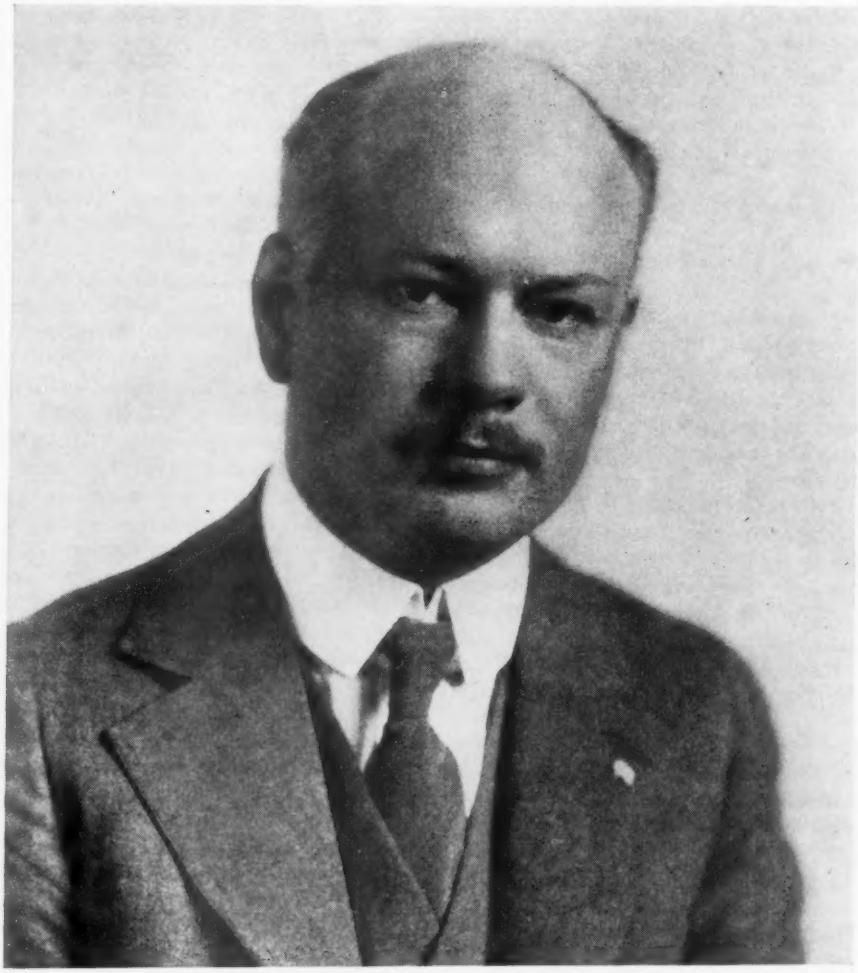

ALBERT CHAMPION

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Albert Champion was born in Paris, France, April 2, 1878, a son of Mr. and Mrs. Alexander Champion.

At the age of twelve, he obtained employment as an errand and office boy for M. Clement, a Paris bicycle manufacturer.

His day began at six o'clock, when he opened the little bicycle factory on the Rue Brunel where he worked twelve out of every twenty-four hours of the day. He swept and dusted the office and shop every morning and wound the clock and attended the fires.

Sometimes he washed the windows, split kindling, and carried in the coal for the stove. When the office employees arrived, they found everything in readiness for the day's work. Then the indefatigable office boy ran the copy press for making tissue-paper copies of the letters written the day before in laborious and flowing French script. Every Saturday night, six francs were doled out to him by his employer, and these he promptly carried home to his widowed mother to swell their slender family income.

One day the lad came bumping down the Rue Brunel faster than usual.

"Why don't you try racing?" asked M. Clement, who stood in the door of his shop. "There is the Middle Distance Championship coming soon. Try it. I've never seen anybody who could pump a wheel faster."

Officials in charge of the races demurred about entering the youth because of his age, but they were finally persuaded to let him participate.

This was in 1894 and the beginning of Albert Champion's bicycle racing. He won the Middle Distance Championship and some money besides, and from then on he turned his attention to speed. He had become famous overnight. He made more money on his first race than he had been earning in a year.

A trainer, "Choppie" Warburton, offered to coach him, and Albert accepted the offer, although at first he thought that he needed no training. "Choppie," Mr. Champion used to relate in later years, made him pedal from Paris to Orleans, 101 miles, between breakfast and lunch; then he fed him a sandwich and made him pedal back.

It was a stiff grind for a young boy, but he was learning to take punishment and endure grueling races. He learned from "Choppie" that one must be physically fit to be mentally fit.

In 1899, Mr. Champion came to the United States for a series of races. He had been making $20,000 a year in France, and he was able to bring with him bicycles, tricycles, motorcycles, motors, and magnetos. He capped his French bicycle championship with the American championship and then won the world championship. He also took part in automobile and motorcycle races.

About that time, the world suddenly went "automobile mad," and Mr. Champion went back to France and studied automobile manufacture with the idea of becoming a salesman for accessories in the United States. He returned to this country in 1900.

He still was interested in speed and drove a Grey Wolf, an early Packard, in a race at Brighton Beach, New York. He went through the fence in that race and sustained a broken leg which nearly resulted in an amputation. On top of that accident, he received an offer for eighteen races in France. Despite the doctors' warning that the leg might have to be amputated, he went back home and drove the eighteen races. During this time, he also studied automobile mechanics. When he returned to the United States again, he found himself accepted and hailed as an authority on automobiles.

About 1905, Mr. Champion went to Boston and opened a shop to produce various ignition appliances. The business flourished, and additional capital was needed for expansion. The furnished capital acquired majority control of the business, which was known as the Champion Company.

Mr. Champion then went to Flint, Michigan, the scene of bustling automobile activities, where he met W. C. Durant and arranged to manufacture spark plugs under the name of the Champion Ignition Company, which name was changed later to the A C Spark Plug Company (the "A C" for Mr. Champion's initials). Mr. Durant supplied the capital and acquired a 50% ownership in the new Company, which 50% was acquired by the General Motors Corporation around 1919. Mr. Champion acquired a minority interest, and 12½% of the stock went to his close associate, Albert Schmidt, a mechanical genius from France, who played a prominent part in designing machinery and in establishing manufacturing methods.

Just before Mr. Champion's death in the fall of 1927,* Mr. Schmidt sold his interest to the General Motors Corporation. About 1929, this Corporation acquired a 100% interest through the purchase of the remaining stock held by Mr. Champion's estate.

* See *Bull. Amer. Ceram. Soc.*, **6** [12] 373–75 (1927) for a notice of Mr. Champion's death.

LOTUS WARE, A CONTRIBUTION TO INFORMATION ON THIS WARE*

By Arthur S. Watts

The historical article on lotus ware, appearing in the *Bulletin of The American Ceramic Society*, pp. 151–57, August 15, 1942, created a renewed interest in this superb china, and through the cooperation of A. V. Bleininger a specimen was secured from the East Liverpool Ceramic Museum and was used as the basis of the investigation.

* Received January 6, 1943.

The fragments were immersed in cold hydrofluoric acid solution until all glaze had been etched away, then thoroughly washed in distilled water, and dried.

A chemical analysis of the body was made by D. J. Demorest of the Department of Metallurgy, whose competency is nationally recognized. The results are as follows:

	(%)		(%)
SiO_2	39.65	CaO	16.65
Al_2O_3	19.95	MgO	0.55
Fe_2O_3	0.35	K_2O	3.31
TiO_2	0.10	Na_2O	1.90
P_2O_5	16.95		

From this analysis, the probable raw batch composition was calculated as follows:

	(%)
Potash feldspar	18.38
Soda feldspar	14.97
Kaolin	31.15
Bone ash	34.73
Free flint	0.77

The feldspar undoubtedly is a medium potash-high soda feldspar of the type common to the years 1880 to 1890 and may have come from the Brandywine Summit (Pennsylvania) or Connecticut mines.

A microscopic examination of the body by W. J. McCaughey of the Department of Mineralogy, a nationwide authority in his field, discloses a particle size of the ingredients in the body which could not have been attained by any known grinding process, the largest particles being approximately 2 microns in size. This discovery led to the conclusion that the feldspar must have been prefused because, in all known bodies containing raw feldspar, a firing temperature as high as cone 14 (1405°C.) does not completely destroy the identity of the larger feldspar particles. Investigations made by P. F. Collins in 1928 disclosed only a limited solubility of bone ash in raw feldspar. With approximately 35% of bone ash in this body, it seems probable that the extreme fineness of grains could be the result of a dissociation of the bone ash in excess of the small amount that would go into solution in the prefused feldspar present in the body. Dr. McCaughey found evidence of none of the normal original minerals in this lotus ware body.

Similar microscopic investigations on specimens of selected English bone chinas disclosed grains of feldspar modified on their edges by reaction with some base, probably lime derived from dissociated bone ash. The English bone chinas definitely display an arrested thermochemical reaction evidenced by particles of what probably was once feldspar and also particles of undissolved quartz, although the latter are present in amounts not exceeding 4 or 5% of the total body. The identity of bone ash as tricalcium phosphate [$Ca_3(PO_4)_2$] is not certain, and the evidence of investigations in the system CaO–P_2O_5–SiO_2 suggests that the bone ash probably has broken down to a calcium phosphate lower in calcium, thus liberating some CaO for reaction with the feldspar. The definite statement regarding the state of the bone ash in this lotus ware body must await X-ray analysis.

All of the evidence points to the safe conclusion that in the manufacture of this lotus ware the feldspar was first calcined with some amount of bone ash and that this calcine or perhaps frit was then mixed as a ceramic body with the clay and the remaining bone ash.

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USE OF SODA ASH FOR STRUCTURAL CLAYWARE PRODUCTION BY BARKER-TRUOG PROCESS*

By Henry W. Harrington

Abstract

The general benefits derived from the use of soda ash are reviewed. Specific examples of the use of soda ash in structural clay plants are given to show (*a*) the satisfactory methods of introducing soda ash, (*b*) the effects obtained with different types of raw materials, and (*c*) the benefits derived from decreased power costs and improved quality of product as well as from an increase in the percentage of firsts.

I. Introduction

The Barker-Truog process of improving the quality of structural clay products and in many cases of reducing costs by adding soda ash to the clay to control pH and the character of base saturation is used in more than twenty commercial plants scattered over a wide area. It is the purpose of this paper to describe the operation of the process and the results obtained in six typical plants during the past year or two. Technical details of the process, including methods of arriving at the correct soda ash treatment, have been published by Barker and Truog.[1]

II. Benefits

The benefits obtained through the use of the process will

* Presented at the Forty-Fourth Annual Meeting, The American Ceramic Society, Cincinnati, Ohio, April 22, 1942 (Structural Clay Products Division). Received September 8, 1942.

[1] (*a*) G. J. Barker and Emil Truog, "Improvements of Stiff-Mud Clays Through pH Control," *Jour. Amer. Ceram. Soc.*, **21** [9] 324–29 (1938).

(*b*) G. J. Barker and Emil Truog, "Factors Involved in Improvement of Clays Through pH Control," *ibid.*, **22** [9] 308–12 (1939).

(*c*) G. J. Barker and Emil Truog, "Further Investigations in Improvement of Clays Through Control of pH and Character of Base-Exchange Saturation," *ibid.*, **24** [10] 317–22 (1941).

be given in the order of plant operation rather than in order of importance. It should be borne in mind that the variations in physical, mineralogical, and chemical characteristics of clays and shales mean variation in the degree to which these raw materials respond to pH and base-saturation control through soda ash treatment. Because of peculiar and unusual characteristics, there are some clays and shales which do not respond sufficiently to make it economically attractive to treat them with soda ash.

The benefits to manufacturing operations, in general, may be listed as follows: (1) increased plasticity; (2) reduction of the water required to obtain the same temper; (3) reduced power consumption by the auger machine because treated material slides through the die with less friction (this power reduction usually ranges from 10 to 20%); (4) reduction of lamination caused in part by increased plasticity and partly by the reduced die friction; (5) considerable reduction of wear on dies, liners, and pug-mill knives; (6) a smoother running column and smoother cuts with less loss through mechanical defects; (7) green ware which has greater toughness and is therefore easier to handle without damage; (8) an aid in drying in many cases; (9) increase of dry strength with increase of plasticity; this effect leads to substantial savings in many instances because of the increased ability of the dry ware to withstand mechanical shock in moving drier cars and in setting; the increased ability of the dry ware to withstand load frequently results, moreover, in considerable reduction of kiln losses; (10) a denser finished product at normal firing temperatures; (11) in red-firing clays and shales, a deeper color at normal temperatures accompanies the increased density; this effect is being utilized at several plants to produce greater percentages of first-quality ware (this will be discussed in somewhat more detail later in this paper); scum formation on the fired ware is often decreased and even eliminated in many cases; and (12) with materials whose maturing temperatures are depressed by soda ash treatment, normal results of color and absorption are obtained at temperatures below those employed for firing untreated material.

III. Methods of Application

The method selected for the introduction of soda ash at any plant is largely governed by the physical characteristics of the raw material itself and by the mechanical set-up of the plant under consideration. Soda ash treatment need not involve important changes of process or equipment, and it usually requires only an inexpensive device for feeding. In fact, satisfactory and sufficient equipment is already available at many plants and may be utilized without change.

In the majority of cases, the simplest method is to feed dry soda ash continuously to the pug mill at the point where clay is introduced. If the raw material is charged with a disk feeder, it is frequently possible to introduce soda ash to the feeder disk. If a dust conveyer belt is used, this may be a convenient point at which to feed the soda ash. Some operators, however, prefer to add the soda ash at the dry pans. This method is satisfactory if the raw material is fed to the pans at an even rate and if it does not differ in ease and speed of grinding from day to day.

As soda ash is readily soluble in water, it may be introduced in the tempering water in the same manner and with the same equipment used frequently for the introduction of barium carbonate. It should be remembered, however, that the regulation of flow from a solution tank to compensate for any variation in moisture content of the raw material causes a corresponding variation of the soda ash treatment. This may be obviated by using a more concentrated solution at the pug mill at a continuous rate; the remaining water required for pugging is supplied as clear water.

Soda ash is also introduced in solution by means of a dry feeder and a rather small agitated solution tank from which the tempering water is drawn. The feeder itself, set to deliver soda ash at the same rate as if it were delivered to the pug mill, is placed so as to discharge into the solution tank in which the liquid is maintained at a constant level by water introduced through a float valve. Operation of this feeder may be synchronized with the clay-feeding mechanism by driving from the same power source or it may be controlled manually by the pug-mill operator as he starts or stops the pug mill.

If wet pans are used for tempering, either the first or second solution method may be employed or a measured quantity of dry soda ash may be added to each pan charge.

In rare instances, when there is no constant rate of flow of raw material to afford a convenient point at which to introduce the soda ash, as in some soft mud process brick plants, the soda ash may be introduced into the raw clay hopper with the carloads of clay coming from the clay-bank. This method is not recommended, however, if other means of introduction can be devised.

There are numerous devices on the market which serve satisfactorily for the dry feeding of soda ash. Several of the clayworking-equipment manufacturers supply small feeders which are quite accurate, and there are at least two manufacturers who supply electric vibratory feeders which are easy to install and are accurate.

Many users employ small power-driven grain grinders which are fairly accurate, inexpensive, and by supplying power from the proper source will start and stop with the clay feed without the pug-mill operators' attention. They will also pulverize any lumps which may form in the soda ash during storage. Small inexpensive and accurate fertilizer feeders are also used in some cases quite satisfactorily.

IV. Computation of Treatment

Because of the varying percentages of tempering water required by different raw materials, the soda ash treatment is computed on the basis of per cent of the fired weight of the product. A convenient formula to use is as follows:

$$\frac{\text{Units/min.} \times \text{unit weight} \times \text{treatment (\%)}}{100} = \text{lb. of soda ash/min.}$$

If a certain brick is to be treated with 0.2% of soda ash and if the production rate is assumed to be 150 brick per min., with a fired weight of 5 lb. each, the formula is as follows:

$$\frac{150 \times 5 \times 0.2}{100} = 1.5 \text{ lb. of soda ash/min.}$$

The quantities used in the foregoing calculation are fairly typical, and, as the price of soda ash is low, the cost of the

treatment may be easily counterbalanced by the savings obtained and leave a comfortable margin of profit and a better product.

V. Results of Commercial Applications

The many plants using soda ash treatment regularly employ as raw materials red-firing shales and clays of various types and fire clays formed by the stiff- and soft-mud processes. A wide range of products is also covered, including ceramic glazed ware, face brick, common brick, and hollow tile. Six typical examples have been selected from among these plants. Some of them represent nearly the minimum of investment as referred to their capacity; others are generously equipped. Such a selection covers the widest possible range of conditions.

(1) A plant making hollow tile from a rather short surface clay: Soda ash is fed dry to the belt carrying clay to the pug mill. The power saving is unusually high and plasticity is greatly increased. When this material is used without the soda ash treatment, it is difficult to obtain a mechanically sound column and to handle the tile so made without damage. The treated material, however, extrudes well, is not difficult to handle, and makes an excellent product.

(2) A plant making face and common brick by the stiff-mud process from a fairly plastic shale: Plasticity has been increased, power requirements reduced, and a smoother column of better structure has resulted. The considerably greater dry strength has reduced losses in transferring cars and in setting. Before treatment, the finished product was extremely brittle and the dark color was somewhat dull. The treated brick, however, when fired, are less brittle and of clearer color. This reduction of brittleness effects a still further saving of brick formerly degraded by chipping in handling. These benefits have been obtained without any changes of forming, drying, or firing procedures. Soda ash is introduced by a dry feeder to the dry pan.

(3) A plant making face and common brick using a very short shale, difficult to work and of low dry strength: Soda ash is introduced dry to the disk of the dust feeder. Without treatment, it was practically impossible to adjust dies or their lubrication to produce a sound column and considerable production time was lost. To obtain as much production as possible, it has been necessary to use a soft temper. The use of soda ash makes it possible to temper the material as stiff as desired and still have a sound column. The power reduction is considerable.

To put it another way, the soda ash treatment permits a striking stiffening of temper without a change in the ammeter reading. Before treatment, the column and green brick were too soft to handle without damage, whereas the column can now be run so stiff as to cause breakage of cutter wires. When changing from untreated to treated material without changing the temper, the ammeter reading dropped approximately 25%. The increase of dry strength is marked, and the loss of dry brick has been reduced considerably. The fired product is much improved in hardness, mechanical perfection, structure, and color.

Hollow tile is an occasional product of this plant and was especially difficult to make from the material at hand. The tile, however, is made quite successfully with the soda ash treatment.

Although the soda ash treatment is not suggested as a substitute for sufficient pugging, this case is interesting from the pugging standpoint. The pug mill in use at this plant when soda ash treatment was started was too short to properly work the material used. A part of the trouble with column cracks and ragged corners could fairly be laid to insufficient pugging. When soda ash was applied, these troubles vanished. Later, a longer and more efficient pug mill was installed, and a trial was made without soda ash. Although the results were not all that could be desired, they were much better than with the former pug mill using untreated material. A return to the use of soda ash has produced still better brick.

(4) A plant using a rather short shale, making common brick by the stiff-mud process, where lamination and drying were serious problems: Soda ash introduced in the dry state to the pug mill has brought about a marked reduction of lamination and column defects, together with power reduction and greater plasticity with less tempering water. Drying losses have been reduced, and a higher dry strength has been reflected in reduced chipping in the dry state. The finished product is a distinctly better brick in color and structure.

As only one type of brick is made at this plant, at a practically unvarying rate of 240,000 per week, a better than usual opportunity is afforded to observe the effect of soda ash treatment on die wear and power consumption. Purchased power is used, and power costs have been quite uniformly $120 per month less than formerly, and die life has been doubled.

(5) Soda ash treatment is of service in the manufacture of soft mud process brick, as well as in the various types of ware made by the stiff-mud process. In one plant, the raw material is quite dry and is prepared by grinding in a dry pan and screening. Soda ash is introduced at the pug mill in the dry state. Because of the shortness of the material, a more plastic material must be brought in by truck from some distance and at a greater cost to mix with it. The material available at the plant fires to a bright red color, but the more plastic material fires to a duller color.

By the use of soda ash, much less of the more plastic clay is required, with a favorable effect on color as well as on raw material cost. With much less machine pressure on the molds, they are more perfectly filled, and the treated brick have better corners and edges. Soda ash treatment also helps in drying, and the dry strength is greatly increased. This latter effect is particularly important in many soft mud process plants, where dry brick are wheeled to the kilns for setting and are thus subjected to rough treatment with resulting high loss from chipping.

(6) A large manufacturer of face brick and hollow tile using shale as a raw material: Soda ash introduced with a dry feeder is discharged into the spray which furnishes tempering water to the pug mill. Power requirements of the auger machine are reduced about 8%. The plasticity and workability of the clay are improved and the clay column presents a much better appearance. The ware to which soda ash is added is substantially stronger and withstands more abuse from the setters. They are able to fire kilns off in about six hours less time than formerly.

Soda ash improves the quality of both the brick and the hollow tile.

Experience at this plant has emphasized an even more interesting point, namely, the property of soda ash of depressing the maturing temperature in firing. The material used has an extremely narrow firing range; about six courses of brick in the bottom of every kiln were formerly so light colored and soft as to be practically unsalable. With soda ash, two different percentages of treatment are used; the heavier treatment is used on the required proportion of the production to set six courses in each kiln, and certain tunnels in the drier are reserved for these brick. These brick are also identified by a scratch mark on the back. Instead of the capacity of each kiln being cut approximately 4500 brick, the kilns now turn out their full capacity of fully fired brick; the brick from the lower courses are as dark and hard as those from the higher courses. The shrinkage, furthermore, is as uniform as the color. The probable usefulness of such a procedure in other plants, in regard to production as well as cost and quality, is interesting.

Another application of this same procedure suggests itself for plants where slight or no actual losses occur through underfired brick in the lower portions of the kilns. If the maturing temperature of ware in selected portions of the kiln may be reduced by similar differential soda ash treatment, over-all firing time may be reduced. Less heat and consequently less time will be required to mature the lower courses of brick which carry the heavier soda ash treatment. Time saved at the last end of a firing leads to worth-while fuel saving, and any saving of firing time is automatically an increase in firing capacity.

VI. Conclusion

The foregoing examples are typical results obtained by the use of soda ash in the Barker-Truog process and represent a wide variation of raw materials and plant procedure as well as of geographical location. Development along the lines discussed was never of greater importance than at the present time when high-quality production at minimum cost is urgently needed.

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FIBERGLAS: SOME PROPERTIES AND NEW APPLICATIONS*

By F. V. Tooley

Abstract

Fiberglas is produced in two basic forms, namely, as a wool and as a textile. There are three varieties of wool: (1) thermal-insulation wool, the starting point for a large number of insulation products; (2) bonded mat wool, used in the form of a retainer mat in electric storage batteries; and (3) air-filter wool, used in the cleaning and conditioning of air. Textile fibers are of two types, continuous and staple. These two types represent starting points in the construction of numerous yarns, tapes, and fabrics used for electrical insulation and chemical filtration purposes. Other applications range from use as wicking for oil lamps and stoves to use as a pipe lagging material. The versatility and utility of Fiberglas are a consequence of the chemical and physical properties of the original basic fibers and the high adaptability of the fibers for predetermined orderly organized arrangement. Fiberglas can be used profitably wherever (1) electricity is generated, transmitted, or used, (2) air is cleaned or conditioned, (3) heat is conserved, controlled, or excluded, and (4) fabrics are needed to withstand heat, rot, dampness, decay, or chemical attack. New and future applications of Fiberglas include its use or development as (1) a wicking in combination with peat moss to feed solutions, through controlled capillarity, to the roots of growing plants; (2) a combination insulant and surface finish in the form of a new strong, rigid, lightweight board; (3) a new low-temperature insulating medium in the form of an asphalt-enclosed rigid bat; (4) a surgical suture and tracer yarn in surgical sponges; and (5) a decorative fabric. Used as an effective replacement material for cork, nonferrous asbestos, aluminum, and mica, Fiberglas is becoming increasingly important as a strategic material.

I. Introduction

Knowledge of new materials, of the jobs they will do, and how they will do them is an all-important factor in making the most effective use of research, engineering, and designing time. There are many materials for which such information could profitably be summarized at the present time. This is particularly desirable in the case of Fiberglas because of the rapidly expanding scope of its application and the attendant difficulty of keeping the technical man informed as to what this unique material can do or is doing technologically. In 1931, there was but one Fiberglas product; today, 380 separate Fiberglas products are manufactured, and large quantities of basic fibers and yarns are contributing to the value of a wide variety of independently manufactured articles.

Glass is an old and faithful servant of mankind, and in this fibrous form, relatively new on the industrial scene, it continues to fulfill its traditional role.

* Presented at the Forty-Fourth Annual Meeting, The American Ceramic Society, Inc., Cincinnati, Ohio, April 22, 1942 (Glass Division). Received May 12, 1942.

II. Basic Fibers and Yarns and Their Production

There are two basic forms of Fiberglas, viz., a wool form and a textile fiber form. The wool form may be further subdivided into three elemental fibers: (1) a fine form used most generally for thermal insulation, (2) a slightly coarser form used as a retainer mat in electrical storage batteries, and (3) a much coarser form used for air filtration in air-conditioning systems. The first of these is the starting point for a large variety of insulation products. Textile fibers likewise exist in two elemental forms, viz., the continuous fiber and the staple fiber, which are used in building up a large number and variety of yarns and threads that are subsequently woven into fabrics of wide utility. Both fibers are much finer than the thermal wool fibers.

All of the basic fibers are produced by the attenuation of molten glass as it issues from small orifices at the bottom of glassmelting tanks or furnaces. In all varieties of wool and staple textile fibers, the attenuation is produced by high-pressure jets of steam or air; the attenuation of continuous fibers is produced by mechanical drawing at high speeds.

(1) Wool Fibers

Wool fibers are collected on a traveling conveyer which carries the pack through a series of automatic operations, the nature and number of which depend on the particular type of product to be made. These processes include lubrication, the application of a binding agent, compression to desired density, the curing of the binding agent, the application of special adhesives and coverings to facilitate handling, and cutting to desired size. Some of the products are complete for use as they are taken from the conveyer. The material often is but semiprocessed, however, and it serves as a raw material in the building of other products (see Sections III and IV).

The wool process consists of a standard glass-tank operation in which the batch is charged in a conventional way at one end of the tank and glass wool fibers are produced at the other. Both the staple and continuous processes differ from the wool process in that each involves the use of glass cullet in the form of marbles. The glass marbles are inspected carefully before they are remelted in special electric furnaces.

(2) Staple Fibers

Staple fibers are collected in the form of a web of interlaced fibers, on a traveling belt from which they are subsequently gathered without twist, as a sliver (pronounced sly′-ver). Staple fibers average 8 to 15 in. in length; the most common variety averages about 0.00027 in. in diameter. More recently, both larger and smaller fibers have been needed, and they have been produced for special purposes. A slight draft is given to the sliver in the gathering operation to orient the majority of fibers in parallel alignment. All staple fiber rovings and yarns are in turn produced from this original staple sliver.

(3) Continuous Fibers

Continuous fibers are made by a different process. The elemental filaments, 102 or more, are continuous in length. After they are gathered into a strand, they are drawn mechanically on a spindle which travels at a speed of a mile a minute or even higher. Lengths of the filaments are limited only by packaging requirements. The individual filaments in the most commonly made continuous strand are 0.00022 in. in diameter, although here again this diameter can be varied considerably on either side according to the characteristics desired in the final product.

Small amounts of lubricants and coatings are used on both the staple fibers and continuous filament strands. These materials, usually starch or vegetable and mineral oils, facilitate the forming operations and keep the individual glass filaments from rubbing together. This application is important, for the strength of glass fibers is reduced if the surfaces of the fibers become scratched.

(4) Yarns

The yarns that go into the manufacture of fabrics are built up from the original staple slivers and continuous filament strands on standard textile machinery, the latter requiring but slight modification. Original continuous strands are twisted and plied together to give any desired yarn construction, the latter depending on the service function to be fulfilled. Ordinarily, yarns will consist of from two to twenty original strands, and the heavier constructions commonly involve as many as ten separate twisting and plying operations.

The original staple sliver is converted into yarn by a drafting and twisting process patterned after worsted yarn methods. Yarns of various degrees of fineness are produced; the degree of drafting is governed by the desired fineness. The coarsest staple yarns are made without drafting.

III. Properties, Products, and Applications

(1) Properties

The great utility and versatility of Fiberglas arise from two fundamental sources, viz., (1) the physical and chemical properties of the glass from which the basic fibers are made and (2) the adaptability of the fibers to organized formation and arrangement which makes possible the building up of derivative products of prescribed and exacting specifications.

Reduced to fibers, the properties that characterize glass in general are retained, although some properties are modified considerably. Brittleness disappears as a practical consideration and is replaced by flexibility and resiliency. The tensile strength of glass increases extraordinarily as the size of the unit or, in this case, fiber is decreased. Fibers with calculated tensile strengths as high as 2,000,000 lb./sq. in. have been produced in the laboratory. Fibers of a size used in regular continuous-filament production show tensile strengths of around 300,000 to 500,000 lb./sq. in., a value considerably more than the tensile strength of hard-drawn steel piano wire.

Glass fibers are incombustible, a property which is of extreme importance in practically all applications from the safety standpoint. High-heat and electrical resistance are responsible for the wide applicability of Fiberglas in the electrical field. Tapes, yarns, and fabrics used in the electrical industry can safely withstand temperatures up to 1000°F.

The electrical properties of glass are retained in fiber form and are augmented by the use of glasses substantially free of Group 1 alkalis. Fiberglas electrical tapes combine high dielectric strength and electrical insulation resistance with extremely low moisture absorption.

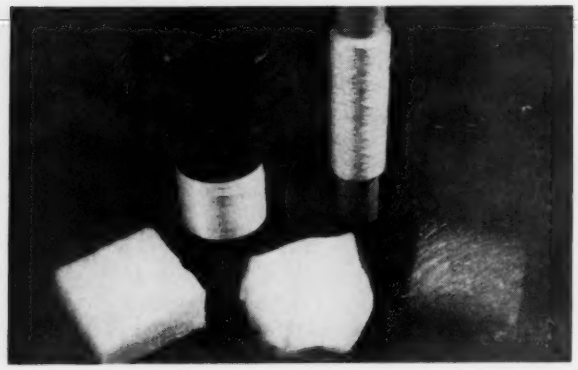

FIG. 1.—Basic fibers used in the production of Fiberglas products. Top row (*left to right*): continuous filament strand and staple sliver; bottom row (*left to right*): insulation wool, bonded mat fiber, and air filter wool.

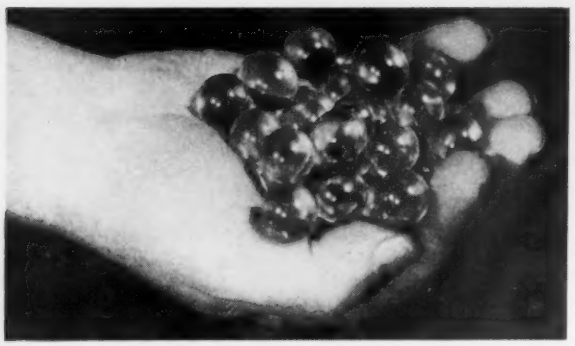

FIG. 2.—Carefully inspected marbles used in the manufacture of textile fibers

Chemical durability becomes of increasing importance when the glass surface is increased by fiberizing. A degree of attack which would be negligible in a large article is a serious matter with a small fiber, so special glasses must be employed according to the service conditions to be encountered.

The thermal and air-filtering properties of Fiberglas result from its general fiber form and adaptability to formability and organized arrangement. In the case of thermal-insulation wool, this adaptability makes possible the formation of a fiber mass with a maximum of dead air spaces. In the case of air filter wool, a structure with adequate strength having an extended surface for the application of the dust-catching adhesive, low resistance to the passage of air, and high-heat resistance is made possible. The properties of incombustibility and durability are here again of great advantage.

(2) Products and Applications

As a general statement concerning the applicability of Fiberglas, it may be said that this versatile material can be profitably used wherever (1) electricity is generated, transmitted, or used, (2) air is cleaned or conditioned, (3) heat is conserved, controlled, or excluded, or (4) fabrics are needed to withstand heat, rot, dampness, decay, or chemical attack.

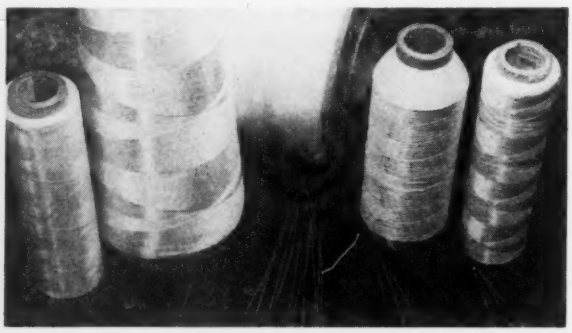

FIG. 3.—Continuous filament yarns on various types of packages

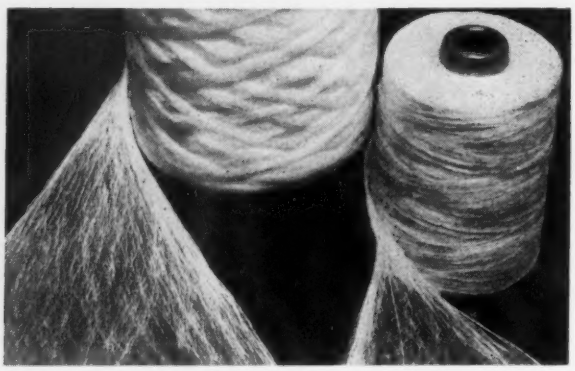

FIG. 4.—(*Left*): plain staple fiber as gathered on the forming tube; (*right*): low-twist staple yarn reinforced with continuous filament yarn.

The electrical industry is the chief user of Fiberglas in its textile form. It is used widely as tapes, cloths, braided sleevings, and tying cords for the insulation of electric motors, generators, transformers, and other types of operating and distributing equipment. Because relatively thin layers of glass tape will insulate well and because its remarkable resistance to heat will allow motors to operate at much higher temperatures than when alternate insulation materials are used, Fiberglas offers the advantage of weight and space savings, higher operating efficiencies, and lower equipment maintenance costs when used with suitable varnishes and impregnants and in accordance with sound engineering techniques.

In the chemical field, glass fabrics are being used as (1) chemical filtration cloths, especially under conditions involving corrosive liquids or gases at high temperatures, and (2) anode bags for electroplating processes. Miscellaneous industrial uses of Fiberglas fabric range from pipe lagging and facings for insulation block to wicks for kerosene or oil lamps and stoves.

Fiberglas thermal-insulation wool is processed into many forms to make it more adaptable for particular uses.

Density, degree of flexibility or rigidity, external form, and surface condition can all be varied to suit the application. Thus the material is prepared for home and industrial purposes not only in the form of a fleecy white wool of $1^1/_2$ lb. per cu. ft. density, but also in flexible-to-rigid sheets, metal-mesh and sewn blankets, blocks, and boards of predetermined specifications, which are used for insulating all types of industrial equipment in all temperature ranges from subzero to 1200°F., according to the product. Standard sizes and thicknesses of sectional pipe insulation are also fabricated from the original basic thermal-insulating wool fiber.

FIG. 5.—Fiberglas sleevings, tying cords, electrical insulating tapes and cloths, and chemical filtration cloths. These illustrate only a few of the end products built from the original textile fibers by a succession of twisting, plying, weaving, and braiding processes.

In these different products, Fiberglas thermal-insulating wool fulfills the necessary requirements for a good industrial insulation, namely, low thermal conductivity, fire safety, enduring resistance to vibrations and settling, lightness in weight, cleanliness, and durability.

Bonded mat fiber finds its greatest use as retainer mats in storage batteries. These mats greatly extend battery life by keeping active material in place on the battery plates. They can serve this purpose because the glass employed in them is resistant to attack by the battery acid and has good electrical insulation characteristics. Bonded mat products have been used less extensively as a light-diffusing medium, as an inorganic facing material, and as a coating for underground pipes to combat electrolytic corrosion.

In the field of air conditioning, the adaptability of Fiberglas to organized arrangement is again recognized. The filter units for removing dirt, lint, soot, plant pollens, and similar nuisance dusts from the air are built up of a series of filter mats which differ in the sizes of fibers used in their construction. The individual fibers are coated with a dust-catching adhesive. This orderly arrangement allows a large surface contact in a limited space and offers relatively low resistance to the passage of air. These combined properties mean, on integration, a high capacity for cleaning air.

IV. New and Future Applications

New effective Fiberglas products and applications are gradually finding their way into industry and others will soon appear.

Some of the new developments are improvements on old products, and in general these depend on the important Fiberglas property of adaptability to orderly, predetermined arrangement. Such a development is the reinforced staple sliver. The incorporation of a continuous strand in the staple sliver during forming or twisting prevents further drafting and yields a product which is an effective filler for electrical cables.

Other new developments have grown out of newer methods of processing and application which take fuller advantage of certain desirable properties.

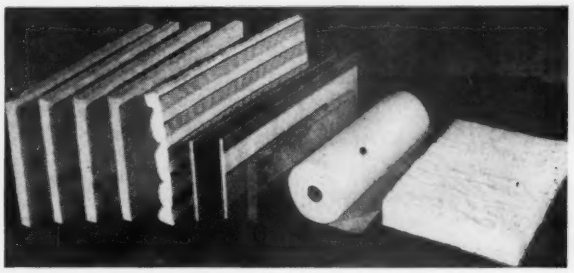

FIG. 6.—Some products derived from insulation wool and a roll of bonded mat fiber frequently used as a facing material.

An interesting new application of Fiberglas is in the field of hydroponics, where effective use is made of its heretofore relatively obscure property of controlled capillarity. Glass-tape wicking in combination with peat moss feeds chemical solutions to the plant roots at a fixed rate.

Fiberglas thermal-insulation wool is the raw material used in the production of a new strong, rigid lightweight insulation board by a newly developed process that combines pressure and a carefully controlled heating cycle to increase the density of the material without loss of resiliency. This board, used largely as a combination insulation and surface finish, releases for other purposes large quantities of aluminum formerly used as a facing material over Fiberglas insulation wool.

Developed to replace cork for low-temperature insulation, Fiberglas AE board, a rigid bat of insulation wool enclosed in asphalt, is being widely used in domestic food-storage lockers and in other large-scale refrigeration units.

In the field of medicine, Fiberglas is undergoing thorough investigation as a surgical suture[1] and as a tracer yarn in surgical sponges.[2] In addition, Fiberglas tape is being used to filter blood plasma in army field kits.[3]

Both bonded mat of the type used in batteries and chemical filter cloth have been used quite successfully in

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[1] Roy P. Scholz and Philip S. Mountjoy, "Fiberglas Suture Material," *Amer. Jour. Surgery*, **56** [3] 619–21 (1942).

[2] Edward F. Lewison, "Rayable Gauze as a Factor of Safety in Surgical Operations," *Bull. Amer. Coll. Surgeons*, **27** [1] 39–40 (1942).

[3] "New-Type Plasma Filter Will Aid in Prevention of Fatal Wound Shock," *Surgical Business*, June, 1942.

laboratories as filtering pads in Büchner funnels when the solutions being filtered were destructive to ordinary papers.

Many decorative applications of Fiberglas have been developed in the past, and this development undoubtedly will proceed at some more appropriate future time. Various colored damasks, brocades, satins, taffetas, and nets have been well established, and products made from these include overdrapes, glass curtains, shower curtains, bedspreads, tablecloths, and lamp shades.

V. Role of Fiberglas in the War Emergency

Used as an effective replacement material for cork, nonferrous asbestos, aluminum, and mica, Fiberglas is becoming important as a strategic material in the war program. Electrical manufacturers and design engineers have achieved savings in both space and weight in new electrical equipment through the use of Fiberglas electrical tapes and cloths. Fiberglas is taking the place of cork in certain types of low-temperature insulation. It is also combined with mica in the manufacture of ground insulation for electrical equipment, thereby reducing considerably the quantity of mica required.

Research Laboratories
Owens-Corning Fiberglas Corporation
Newark, Ohio

MODELING SHEET GLASS IN A POTTERY KILN*

By Dolly M. Ernst

Abstract

A method is described for obtaining relief pattern in sheet glass while bending it into decorative and usable forms.

The fact that sheets of glass may be bent in a ceramic mold in a pottery kiln has been discovered in the Ceramic Laboratory of the University of Cincinnati. When the glass is cooled, it has an appearance quite different from the crisp perfection of glass bent in the smooth metal molds used commercially. It is more like old hand-rolled glass.

The tendency of the heated glass, as it bends to the shape of the mold, to pick up impressions of each minute raised particle may be developed into impressions of definite, calculated relief patterns.

The process is simple. Molds are made of clay, the design is modeled thereon, and they are biscuited. A wash of clay and flint (25 and 75%, respectively), plus a little gum tragacanth, is applied to the mold to prevent the glass from adhering to it. A clean sheet of glass cut to fit the outer contour of the mold is placed on it, and it is ready to be put into the kiln. The temperature is brought up slowly to a point just sufficient to cause the heated glass to move down. It sinks as a heavy film, finding the various levels of the modeled surface.

The temperature required varies with different glass compositions. Experimentation is necessary to find the temperature best suited to the type of glass being used. It will probably be around cone 012, or 1544°F. Proper regulation of temperature is required because heat that is too high or that is maintained too long will cause the surface to slip or to devitrify.

The kiln must be cooled slowly to anneal the glass, as rapid cooling to rigidity will create strain.

The upper surface of the molded glass will be smooth and will need no further attention. The under surface, however, will require cleaning inasmuch as some of the kiln wash may be picked up. A mild abrasive and a wet brush may be used, but neither should be hard enough to scratch. A silicon carbide stick may be needed to smooth the edge if the firing has been too drastic.

To find the full extent of the ups and downs that the glass will take, a coarse clay has been used for the forms, because the chance of cracking or breaking is lessened if designs are worked out in high relief. This explains the pebbled texture of some of the pieces. The porosity of the biscuit causes the kiln wash to dry with a pebbled surface.

The type of modeling also affects the success of the impression. The heavy creeping mass of heated glass has a tendency to slide over the crevices. Definition is given by a calculated change in form that checks this viscous flow an instant, giving an accent where it is needed; otherwise, the pattern may show as a lot of meaningless bumps in the glass. The exact reproduction of designs pressed into a mold in the traditional manner should not be expected or attempted.

The outer contour should be controlled by designing the mold so that a support for the edges of the sheet of glass is provided or warpage may occur if the heat of the kiln is uneven. Small holes may be drilled in the deep crevices if the modeling is in quite high relief to expel any trapped air that may cause a bubble in a reverse direction.

A surprising amount of modeling is possible. A variety of different impressions may be made from the same mold by using different foreign and domestic glass compositions. Single- and double-strength window glass is used for small molds; crystal and plate glass are used for large molds. All types of glass bend satisfactorily; the temperature required, of course, varies.

Other experiments have consisted of stacking layers of glass together. Glass, cut in triangles, squares, etc., and placed in pattern on flat sheet glass laid on a mold fuse together as the glass bends to the mold. When various-colored glasses are combined, chipping and crazing occur if the formulas are not "sympathetic." Design possibilities are limited, owing to glass-cutting difficulties. Overglaze ceramic colors applied on a flat sheet in the same manner as glass enamels also bend with the glass.

Ceramic molds are durable in a commercial, moving, circular kiln. Glass bends satisfactorily in an undecorated mold, but few perfect impressions are obtained from the decorated molds. A pottery kiln gives a better texture to the glass.

The materials needed for the modeled bent glass are inexpensive, and, aside from a pottery kiln, little equipment is required.

Rural Route 3
Loveland, Ohio

* Presented at the Forty-Fourth Annual Meeting, The American Ceramic Society, Cincinnati, Ohio, April 21, 1942 (Art Division). Received September 15, 1942.

CONVERSION OF GLASS FURNACES FROM OIL TO GAS AND FROM GAS TO OIL*

By Gerald Fitzgerald

I. Natural Gas Supply

Present conditions of gas and oil fuel supply are reminders of previous conditions of shortage which have occurred from time to time within the past twenty-five or thirty years.

In 1910 and 1911, the natural gas fields of Indiana and Ohio were gradually failing after having produced enough natural gas to build up the industries of that section of the country. Glass manufacturers had already turned to producer gas or to oil as the principal fuel, although some factories still could obtain enough natural gas upon which to operate.

About 1914 or 1915, an Indiana gas company with which the writer was associated at the time brought in a supply of natural gas by connecting with the system of the East Ohio Gas Company, which in turn obtained most of its gas from West Virginia.

Even with a good supply of natural gas, the industrial customers of this Company had been served customarily on a contingent basis during the winter. When the domestic heating load became too great for the capacity of the supply lines, factories such as glass factories and steel mills were shut off and had to switch to either producer gas or oil until the weather turned warmer.

Consequently, industrial furnaces were usually equipped to burn at least two fuels and sometimes three or four, including natural gas, oil fuel, producer gas, and sometimes powdered coal.

After the new connection was made and the new supply of gas was obtained from West Virginia through Ohio, it was possible to solicit business from the local factories, and in time most of them were equipped to burn natural gas.

Piping and burners had to be installed without interfering with production. Gas lines were run into the factory and up to the furnaces, and the change-over was usually made over the weekend (at that time a short one, usually consisting of Sunday).

Our first glass-furnace installation was made at Gas City, Indiana. This was a low-pressure installation at the regular city main pressure of 4 to 6 oz. Gas was piped into the regenerative furnace immediately over the gas checkers. This installation worked so well that it was possible to equip most of the other local glass factories.

In later installations, the gas was introduced higher up and usually on each side of the gas port. No burners were required for this type of installation; gas nozzles or pipes swadged down on the end formed an orifice, the size of which depended on the amount of gas burned and the pressure of the gas supply. Gate valves were installed to control the flow of gas to each side of the furnace, so that the reversing operation was done as before.

II. Firing with Gas and Oil

Nonregenerative furnaces or direct-fired furnaces, such as lehrs and glory holes, are fired with blast burners. At first, the blast burners were simple, consisting of mixer tees with low-pressure gas and low-pressure air and either plain nozzles or plain drilled pipe burners in the case of lehrs.

When day tanks are fired with gas, burner nozzles can be located on the side or end walls to fire directly through the walls over the glass.

When firing with oil, however, it is usually necessary to provide additional combustion space and distance in the shape of a doghouse hitched onto the side or end wall because (1) the oil must be vaporized to gas before it can be burned (this usually requires additional time, space, and distance) and (2) the doghouse heats up faster and is usually hotter than the furnace and therefore assists materially in obtaining proper combustion.

III. Burners

The old definition about mixing the fuel and air does not work for the radiant-flame gas burner. The gas and air are not mixed and leave the burner in layers.

No single type of gas burner will fire successfully every kind of furnace. Premixing or the intimate mixing of gas and air will result in substantial saving when combustion space can be limited and when the hot gases can be made to scrub the work.

When the furnace cannot be rebuilt, however, and combustion space is too ample or excessive, better results will be obtained from the luminous type of flame, and an appropriate type of burner should be used.

Properly speaking, a burner is not a burner. The fuel and air are brought together, proportioned, and mixed (or not mixed, as the case may be) in the so-called burner and are burned in the furnace, so the furnace is really the burner, and the burner is really an atomizer, an inspirator, or a proportioner.

A successful installation therefore requires a good burner and a well-designed application (about 50% burner and 50% design and application to the furnace). As a result, the burner salesman can be more than a "gadget peddler" and can help his customers produce the results required by proper design and application. Proper attention should be paid to the efficient utilization of fuel, but not at the expense of the product manufactured. As Mr. Doyle of the W. S. Rockwell Company used to say, "What shall it profit a man to obtain a perfect heat balance if the biscuits are tough."

IV. Relative Merits of Gas and Oil

Gas is "nice" if you can afford it. If oil is used, keep it hot. The oil should not be overheated, however, and it is sometimes advantageous to keep the oil in the tank and the circulating system just warm enough to circulate and to bring the oil up to the proper temperature for atomization at the furnace itself by means of individual heaters at each furnace or group of furnaces. In this way, the formation of sludge in the oil tank can be greatly reduced.

Maxon Premix Burner Company
50 Church Street
New York, N. Y.

* Presented at the Autumn Meeting of the Glass Division, Absecon, N. J., September 18, 1942. Received September 23, 1942.

CERAMIC SCULPTURE*

By Paul Bogatay

Abstract

Pertinent comments are given on the relation between artist, museum, and public as affected by the philosophy of the artist, the policy of the museum, and the possible influence on the public. These are followed by specific recommendations, which include technical possibilities and the extension of physical limitations as they relate to a more significant contribution to the contemporary social frame, scene, or environment.

I. Introduction

Within the past ten years, the work of the ceramist and ceramic sculptor has been insistently presented to the American public. The organization most active in promoting ceramics has been the Syracuse Museum of Fine Arts under the direction of Anna Wetherill Olmsted. Through its annual national exhibitions and the nationally circulated shows stemming from them, plus the exhibits sponsored by other organizations and galleries, interest in ceramic sculpture and in the annual ceramic show itself has developed steadily. The Tenth Annual National Ceramic Exhibition held in 1941 under the sponsorship of T. W. Watson of the International Business Machines Corporation and the Syracuse Museum of Fine Arts climaxed that growth.

The exhibit is large, but if growth is to continue it must be justified by the meaning and quality of the work shown. The responsibility is shared by the artists and the sponsors. That responsibility seems to demand closer cooperative action as well as a separate and searching evaluation of aims and policies.

As an attempt to stimulate thought and discussion along these lines, the following personal opinions are offered, not as final conclusions but as suggestions which may prompt a more active consideration of the problem by all those who are concerned in its satisfactory solution.

II. "Naïve" vs. "Real" Qualities

Emphasis in the past exhibitions has been placed too much on whimsy, style, and humor; juries have extolled "new notes," "naïve qualities," and "freshness and sophistication." Publicity has been beating time to the same chant, while some of the real qualities of sculpture and the demands of the materials and process are neglected or denied. It is a question of emphasis. All of the things mentioned previously are important, all contribute to the interest and meaning of the exhibitions, and all have a place in the promotion of education and growth, but the danger lies in their obscuring the more important values through their influence on the young ceramist and the public.

It would be almost impossible and of doubtful value to establish strict limitations for ceramic sculpture and to dictate qualities or an inflexible philosophy to govern judgments of expression in any medium, because it is important to foster experiment in new techniques, processes, and materials. From experiment and experience spring new forms and new qualities of individual expression, but the danger of false values is ever present in the arts as well as in all forms of human activity. Constant effort and positive action to get at fundamentals are necessary to maintain a true perspective. In ceramic sculpture, expression which should be governed by basic requirements of form, structure, and organization is often subordinated to secondary considerations, such as glaze quality, design quality, style, texture, or color. Visual perception is the artist's problem. He solves that problem to the degree that he understands its controls and the controls of his materials, tools, and process. His success in presenting ideas depends on his use of those controls in the expression of forms with structural integrity and effective organization. Intimate understanding of his materials directs the treatment of his expression in the manner which to him seems honest and suitable.

III. Processes Used

The importance of certain traditional process requirements that have been evident in the work of the ceramic sculptors, the Chinese, the Egyptians, the Greeks, and the primitive peoples of the past cannot be denied. Those requirements might well be worth discussion—the idea that nothing further can be done or added to a piece of sculpture after it is fired in order to change its form, texture, or color; that body and glaze be matured; that the forms be plastic and in character with the ceramic process used; that color, glaze, texture, and decoration work together in achieving unity of expression.

For a further discussion of the present activity, the following questions could be asked: Is sandblasting a legitimate technique to use to change the texture or color of a glaze or body after firing? Is the sculptor justified in cutting, chipping, and polishing a fired clay form as he would a piece of stone? Can any material which is ceramic be used in the production of sculpture? Can clay be used in any way the artist sees fit ignoring the plastic quality of form if the expression suits his personal requirements? Can ceramic sculpture in its form relate to forms as evidenced by sculpture in materials such as stone, wood, metal, or others? Are ceramic forms of a definitely recognized character? Although individual artists may answer these questions in different ways, could they as a group agree that final judgment of artistic merit should be based primarily on meaning and expression as evidenced by the quality of the finished work?

The ceramic sculptor working under physical restrictions of equipment has been limited in the production of large-scale pieces. A great deal needs to be done in that direction if significant growth is to continue. Manufacturers

* Presented at the Forty-Fourth Annual Meeting, The American Ceramic Society, Inc., Cincinnati, Ohio, April 22, 1942 (Art Division). Received April 23, 1942.

with large-scale facilities who are willing to cooperate with the artist can give invaluable assistance in the proving of experiments. More can be done with brick used for architectural sculptures, and some of the porous refractory brick and tile can be carved easily and directly. These latter materials used with vitreous slips or glazes can be made to fulfill practical requirements and are not limited by the shrinkage problem. Norton[1] has developed a casting body with a low shrinkage. Other clays have been developed for architectural and outdoor sculpture to fulfill the needs of individual sculptors and government agencies for housing and other units. Interesting colors and textures of clays and glazes have been worked out which take advantage of new materials such as bentonite, aluminate gels, and various kinds and colors of grog. New possibilities involving the use of salt glaze are also in view. The extension of techniques presents the need for more flexible firing facilities, namely, a design for a low-cost kiln for firing large sculpture efficiently which would be suitable for schools, laboratories, or studios.

Many of the large sculptures produced and shown at the annual exhibitions have been the work of artists with little experience in ceramics, with the result that in many instances the sculptor's expression was submerged in the process. Shrinkage in firing impaired size and scale, and glaze obscured quality of form. One of the techniques successfully employed was that used by Archipenko. His work was first fired and then the forms were completed and refined by grinding and polishing.

IV. Conclusion

Progress in the development of new techniques, materials, styles, new uses for ceramic sculpture, and the growth and expansion of influence of the Annual National Ceramic Exhibitions demand more intense individual effort as well as closer cooperative and group effort. With the priorities on metals, more sculptors will turn to fired clay as a substitute and further complicate the picture. No set standard of judgment of values, meanings, or classifications dictating judgments could be established. This would be impractical and undesirable. But data collected through cooperative action might help to clarify and simplify the relationships of sponsor to artist. Such data introduced by a basic philosophy of sculpture would be followed by a philosophy of sculpture in fired clay in the strictest traditional sense. With those statements as a point of departure, personal statements of philosophy expanded to cover our present individual activity in the field would come next, then opinions regarding some of the experimental, technical, and process limitations of materials and their possibilities would follow.

It may be difficult to get such an exposition into a brief form, but if it were done it would be of value as a reference. It might also serve to clarify the direction and function of the artist and sponsor, making more effective the presentation of work.

It also seems reasonable that the artist should be adequately represented on juries and museum boards. He should have a share in the privilege and responsibility of determining policies which relate directly to the judgment, publicity, and showing of his work. Cooperation between museum and artist could be of vital benefit to both groups, as well as to the public, granting that both groups have contributions to make and rights to maintain and that society is vitally concerned with their contributions. Juries of recent exhibitions have obviously been poorly qualified to judge the work submitted. Their poor judgments are reflected by the resulting publicity. All factors lead to the conclusion that the ceramic sculptor and his sponsors should join to more significantly fulfill their separate obligations, should work together to the end of a more vital expression, and that the judgments they make should be soundly based on the quality and meaning inherent in the finished work, putting first things first as the trail is cleared.

Department of Fine Arts
Ohio State University
Columbus, Ohio

[1] F. H. Norton, "A Ceramic Body Specially Designed for the Sculptor," not published; presented at the Forty-Fourth Annual Meeting, The American Ceramic Society, Cincinnati, Ohio, April 21, 1942.

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FORTY-FIFTH ANNUAL MEETING
AMERICAN CERAMIC SOCIETY with seven simultaneous Division meetings. Week of April 18, 1943, Hotel William Penn, Pittsburgh, Pa.

UNITING TO ACHIEVE

ACTIVITIES OF THE SOCIETY

MEMBERS IN SERVICE*

The following members of this Society are in fighting units of war service. There are several in service in Washington not included in this Service Roster. This list, which was begun in September, 1942, and added to each succeeding month, is probably not complete, and we would appreciate information on other members.

ANTHONY M. CAITO, Basic Refractories, Inc., Maple Grove, Ohio.
GEORGE A. CLEEVES, 122 Missouri Avenue, Somerset, Pa.
EUGENE C. CLEMENS, Cannelton Sewer Pipe Co., Cannelton, Ind.
O. O. KENWORTHY, B. F. Drakenfeld & Co., Inc., New York, N. Y.
ROBERT J. MCCANN, Emerson Electric Mfg. Co., Granite City, Ill.
JOHN A. STEWART, B. F. Drakenfeld & Co., Inc., Washington, Pa.
T. J. TAYLOR, W. I. Tycer Pottery Co., Roseville, Ohio.
KEITH F. WALKER, Harbison-Walker Refractories Co., Athens, Texas.
HOWARD F. WEST, 922 Washington St., Lockport, Ill.

* These are in addition to the lists published monthly, beginning with the September, 1942, *Bulletin*.

A MESSAGE FROM HONORARY MEMBER A. S. W. ODELBERG

January 31, 1943

Many thanks for the membership cards of 1942 and 1943. The first I received some time ago (the letter being on the way over a year) and the latter only a few days ago, which shows the postage nowadays is much better.

It has been an awful time these last few years to have been shut up like in a dark room but the light seems now to be breaking through. I often think of you and my American friends and hope the war will soon come to its right end and we may be able to meet in the future.

Neither myself nor my old Works (A. B. Gustavsbergs Fabriks, Intressenter, Gustavsberg, near Stockholm, Sweden) have received any of your Ceramic Society publications since October, 1941. I now ask you a great favor to have the failing numbers sent over as soon as the war is over. To send books or papers now is impossible. Of course, the Gustavsberg Pottery will pay their share upon the receipt of your account. They have asked me to write to you personally. It would also be a very great loss to them if those failing numbers do not come, as they have a magnificent ceramic library.

I am glad to say I am keeping well and send you and all my friends my kindest greetings.

Believe me,
Sincerely yours,
A. S. W. ODELBERG

PROFESSOR TURNER'S APPRECIATION

Sheffield 10, England
14th January, 1943

My dear Ross,

Your letter of December 3d announcing the dispatch of the engrossed statement of appreciation of the gift of the coloured photograph has reached me this morning. The packet containing the engrossed statement came a few days ago. As Secretary of the Society I could scarcely avoid being the first to examine the contents of the package, but I felt as I looked at its contents that perhaps some other person, as, for example, Mrs. Marchand, the Secretary of the Portrait Committee, should have had that privilege.

I confess I was much absorbed as I read down the beautifully worded appreciation. The document in itself is a handsome thing and will, I know, be counted amongst the most intimate treasures of the Society, to be carefully preserved and handed down.

As for myself I can only say that, though a proud and happy man in reading it, it made me feel ardently that I could really go out and try to be of some signal service which would warrant even a fraction of the kind things expressed in the document.

I am sure, however, that my experience has run very largely in parallel with that of your own. The work which you have carried on for The American Ceramic Society, as its chief administrative officer for more than twenty years, has been so full of joy that you can understand my own experience. The friendships which I have made with colleagues in active collaboration in glass technology are those which I value most highly. Amongst them are so many colleagues in the States—men whose personalities and character it has been a privilege to me to get to know.

This is a letter intended to express, inadequately and somewhat confusedly, the great pleasure and feeling of honour which you have done me in sending to the Society your congratulations and thanks for the coloured photograph. I informed Dr. Peddle, the Chairman of the Portrait Committee, last week of the reception of the illuminated letter, and members of the Society's Council will see it for themselves on the occasion of the next meeting on February 17th. Then will come a more official letter of thanks. But I know, in any case, that the strong friendship existing between the two societies will be deepened by this interchange of valued tokens.

Thank you very much for your good wishes about my health. I am happy to say that I am distinctly better now than a year ago and for months have been enjoying my work once again. I trust that the same applies to yourself.

With every good wish,
I am,
Yours sincerely,
W. E. S. TURNER

The photograph of Professor Turner's portrait and a photostat of the illuminated letter sent to the Society of Glass Technology appeared in the January, 1943, *Bulletin*, pp. 22 and 23.

PITTSBURGH SECTION

The Pittsburgh Section met on February 9, 1943, at Mellon Institute, Pittsburgh, Pa.

John A. Eckel, chief metallurgist, Gary Sheet Mill, Carnegie-Illinois Steel Corp., Pittsburgh, Pa., was the speaker of the evening. His subject was "Enameling Iron, Its Properties and Characteristics." The talk promoted a lively discussion on enameling problems and enameling iron.

—H. E. SIMPSON, *Secretary*

CHICAGO SECTION

The Chicago Section held a joint meeting with the Chicago District Enamelers Club February 19, 1943, at the Electric Club, Civic Opera Building, Chicago, Ill.

The following program was presented:

(1) "Porcelain Enamels during and after the War" by A. I. ANDREWS, Head, Dept. of Ceramic Engineering, Univ. of Illinois, Urbana, Ill.

(2) "Ceramics, a New Industry" by HERBERT V. KAEPPEL, Executive Editor, *Ceramic Industry*, Chicago, Ill.

(3) "An Engineer Looks at Argentina" by FRANCIS GODWIN, Assistant Director, Armour Research Foundation, Chicago, Ill. Dr. Godwin returned recently from South America, where he headed the Armour Research Foundation field survey party which was commissioned to make a year's survey of Argentine industry, resources, and raw materials. His talk was supplemented with several reels of color film.

—H. G. FISK, *Chairman, Chicago Section*

PACIFIC NORTHWEST CLAYWORKERS ASSOCIATION

Howard Mansur, Washington Brick & Lime Co., Spokane, Wash., was chosen as president for 1943 at the winter meeting of the Pacific Northwest Clayworkers Association held November 14, 1942, at the University of Washington, Seattle, Wash.

LETTER TO ART DIVISION MEMBERS

If There's Still a Pittsburgh by April There'll Be a Program, by God

It's a good program, some of it by members of the Division. What you're interested in, that's what we got, and what we got belongs to today and tomorrow. Whether it's industrial design, or occupational therapy, or ceramic substitutions for war materials, or up-to-the-minute merchandising, or any of a number of other things just as real, we got 'em. What's more, we said to ourselves this year, that we might as well get, for speakers, those at the top in their respective fields. So we got 'em.

Come April, you'll be doubting your usefulness with reason. Come April, your soul will need a lift, and your heart will need some cheer, and everything you have will be in want. Sassafras won't help you, nor sulphur, nor all the vitamins in the alphabet. But Pittsburgh will. In April there will be companionship, and refreshment, and brand-new usefulness all set out for you in Pittsburgh.

February 2, 1943 —HAROLD S. NASH, *Chairman, Art Division Papers and Program Committee*

DR. HOLDEN SPEAKER AT ANNUAL MEETING

Francis R. Holden, a member of the staff of the Industrial Hygiene Foundation, Pittsburgh, Pa., will present a paper on "Plant Hygiene" during the General Session of the Forty-Fifth Annual Meeting—War Congress to be held the week of April 18 in Pittsburgh, Pa.

Dr. Holden, a specialist in healthful working conditions, is in charge of plant hygiene surveys for the Foundation at Mellon Institute, Pittsburgh, Pa. He assists companies associated with the Foundation, as well as nonmember firms, in controlling factory health hazards which have increased with war production.

Basically a physical and organic chemist, Dr. Holden took his undergraduate work at Hobart College, Geneva, N. Y. He has specialized in industrial hygiene since completing his graduate studies at the University of Cincinnati in 1934.

After a year at the Industrial Health Conservancy Laboratories in Detroit working on hygienic problems in the automobile industry, he joined the Safety Department of the Pittsburgh Plate Glass Company where he was engaged in industrial hygiene for more than five years. Before joining the staff of the Industrial Hygiene Foundation, Dr. Holden had been on the natural gas fellowship at Mellon Institute.

Francis R. Holden

NOMINATIONS FOR 1943–1944*

FELLOWS

Associate Dean†

HOWELLS FRÉCHETTE, Bureau of Mines, Ottawa, Ontario, Canada.

T. N. MCVAY, Dept. of Chemistry, University of Alabama, University, Ala.

ART DIVISION

Trustee: CHARLES W. READ, Shenango Pottery Co., New Castle, Pa.

Chairman: WALTER A. WELDON, Locke Insulator Corp., Baltimore, Md.

Vice-Chairman: THEODORE LENCHNER, Vitro Mfg. Co., Pittsburgh, Pa.

Second Vice-Chairman: MARION L. FOSDICK, N. Y. State College of Ceramics, Alfred, N. Y.

Secretary: MYRTLE M. FRENCH, Art Institute of Chicago, Chicago, Ill.

ENAMEL DIVISION

Trustee: R. L. FELLOWS, Chicago Vitreous Enamel Product Co., Cicero, Ill.

Chairman: D. G. BENNETT, Mellon Institute, Pittsburgh, Pa.

* For Society and Materials and Equipment Division nominations, see p. 47, February, 1943, *Bulletin*.

† One to be elected.

Vice-Chairman: H. D. CARTER, Harshaw Chemical Co., Cleveland, Ohio.
Secretary: D. G. MOORE, National Bureau of Standards, Washington, D. C.

REFRACTORIES DIVISION

Trustee: J. B. AUSTIN, Research Labs., U. S. Steel Corp., Kearny, N. J.
Chairman: C. L. THOMPSON, Harbison-Walker Refractories Co., Pittsburgh, Pa.
Vice-Chairman: W. R. KERR, Armstrong Cork Co., Beaver Falls, Pa.
Secretary-Treasurer: S. M. SWAIN, North American Refractories Co., Cleveland, Ohio.
Nominating Committee A: R. S. BRADLEY, A. P. Green Fire Brick Co., Mexico, Mo.
Nominating Committee B: P. G. HEROLD, Missouri School of Mines and Metallurgy, Rolla, Mo.

STRUCTURAL CLAY PRODUCTS DIVISION

Chairman: L. R. WHITAKER, Carolina Ceramics, Inc., Columbia, S. C.

Vice-Chairman†
CLARENCE P. AUSTIN, Binghamton Brick Co., Inc., Binghamton, N. Y.
E. F. THEOBALD, Metropolitan Paving Brick Co., Canton, Ohio.

Secretary: R. L. STONE, Dept. of Ceramic Engineering, Univ. of North Carolina, Raleigh, N. C.

Nominating Committee A†
M. S. BOWNE, Lee Clay Products Co., Clearfield, Ky.
G. H. DUNCOMBE, JR., 150 E. Frambes Ave., Columbus, Ohio.

Nominating Committee B†
T. W. GARVE, 314 King Ave., Columbus, Ohio.
HARRY D. FOSTER, Box 731, Alfred, N. Y.

WHITE WARES DIVISION

Chairman: JAMES R. BEAM, Universal Sanitary Mfg. Co., New Castle, Pa.

Secretary†
JOHN W. WHITTEMORE, Virginia Polytechnic Institute, Blacksburg, Va.
GEORGE A. LOOMIS, Engineering Expt. Sta., Ohio State Univ., Columbus, Ohio.

Nominating Committee A†
R. M. CAMPBELL, N. Y. State College of Ceramics, Alfred, N. Y.
DONALD HAGAR, Box 328, Zanesville, Ohio.

Nominating Committee B†
R. E. GOULD, Buffalo Pottery Co., Buffalo, N. Y.
L. G. TAIT, Champion Spark Plug Co., Detroit, Mich.

† One to be elected.

AN ASSOCIATE SECRETARY WANTED

The Board of Trustees has approved the employment of an Associate Secretary for The Society. His duties will be to act as an understudy to Ross C. Purdy, to promote increased interest in the Local Sections and Student Branches, and to supplement the other activities now being performed by the General Secretary. A salary will be paid commensurate with the experience and ability of the applicant.

Applications for this position are now being received at the offices of The American Ceramic Society, 2525 North High Street, Columbus, Ohio.

—C. E. BALES, *Chairman,*
Special Committee on Associate Secretary

1942 BALANCE SHEET EDWARD ORTON, JR., CERAMIC FOUNDATION

ASSETS		
Cash and invested funds	$33,505.65	
Receivable	5,675.38	
Materials	20,435.75	
Prepaid	683.01	
Land and building	82,152.59	
Equipment	21,293.53	
Total		$163,745.91
LIABILITIES		
Payable	963.74	
Fellowships	750.00	
Total		1,713.74
NET WORTH ACCOUNTS		
Balance Jan. 1	$154,654.82	
Plus profit to date	14,127.35	
	168,782.17	
Less fellowships	6,750.00	$162,032.17

1942 BALANCE SHEET THE AMERICAN CERAMIC SOCIETY, INC.

ASSETS		
Cash	$13,575.22	
Invested	21,715.16	
Receivable	2,323.29	
Total		$37,613.67
LIABILITIES		
Payable	1,813.22	
Fellows	1,769.73	
Institute of Ceramic Engineers	1,343.77	
Enamel Bibliography	3,611.05	
Building Fund	10.00	
Total	8,547.77	
INCOME NOT EARNED	13,420.59	21,968.36
SURPLUS		$15,645.31

E. L. HETTINGER GIVES SERVICE*

February 17, 1943

Commanding General,
Quartermaster Depot,
Jeffersonville, Ind.

File No. SPQDJ 400.1141 ENG.
(Optics)
Attention J. P. Urbanek, Engr. Div.

Dear Sir:

Your inquiry of February 9 addressed to The American Ceramic Society has been referred to the writer, who has been a member of that Society for more than a quarter of a century, and who, during World War I, developed the production of eye-protective glasses in this country.

First of all, you will find enclosed one copy each of Commercial Standards CS78-39 and CS79-39, covering "Ground and Polished Lenses for Sun Glasses" and "Blown, Drawn, and Dropped Lenses for Sun Glasses," respectively; also a copy of the National Bureau of

* Carbon copy of this letter received in Society offices February 19.

Standards Report C421 on the "Spectral-Transmissive Properties and Use of Colored Eye-Protective Glasses." I believe these will be interesting and useful to you. Also, I would suggest that you secure from the Federal Trade Commission a copy of "Trade Practice Rules for the Sun Glass Industry," promulgated December 23, 1941. Rule No. 2, page 2, will be of particular interest in connection with lenses ground and polished before and after curving.

Several ways of testing can be suggested. One of the simplest is the use of a small projector with a slide such as used by opticians or cameramen in projecting kodachromes. Project the slide on a screen, about 30 or 40 ft. distant, get the image absolutely sharp, then place the lens to be tested directly in front of the projector lens. A properly ground and polished sun-glass lens will cause no blurring of the image, but will, of course, slightly darken it because of the color of the lens. A lens made from ground and polished stock and then curved will blur the image, and the poorer the job the more blurred the image will be. It is next door to a physical impossibility to produce a lens from ground and polished sheet glass bent to a 4 or 6 diopter curve that will be as good as a lens that is curved before grinding and polishing. The whole trouble is that the inside surface will pucker into an almost imperceptible (to the naked eye), egg-shell finish, whereas the outside surface stretches into a smooth finish.

Another way to check up on these lenses is by the reflection test, as you would with a mirror throwing sunlight on the ceiling. Still another method is the black shadow test which any optician can set up for you.

Still another way to test is by the use of a transit and target as per Paragraph F–7 of enclosed Federal Specifications GGG–G–511. A properly ground and polished lens will give a clear image of the target, whereas the lens that is curved after grinding and polishing will always have a minus focus. You can check this by the use of a plus 0.12 lens and a minus 0.12 lens and mark how far the wheel of the transit must be moved to get a clear plus or clear minus image. This way you can check the minus focus that is always present in a dropped lens. In other words, the lens is slightly concave, but this will never show up in the ordinary lensometer or vertometer as these instruments are not sufficiently sensitive to pick up this deviation.

As of possible use to you, I am sending you under separate cover a small slide of a target shown on page 173 (Fig. 113) of the book Experimental Optics by A. F. Wagner, professor of physics, U. S. Naval Academy Post Graduate School, published by John Wiley & Sons, Inc., New York, in 1929. You can use this with the transit by projecting the target on a screen and then aiming the transit to the projected target. You can use it also for the first suggested test. The best way is for you to have someone place these lenses over the projector lens while you get close enough to the screen so that you can see sharply the changes that take place. I will include with the slide several samples, clearly identified, so that you will be able to distinguish the difference. The No. 1 sample will be a ground and polished lens; No. 2 a lens from ground and polished sheet stock (curved after being ground and polished); and No. 3 an ordinary dropped lens. The center may be fairly good but the outside periphery is always poor. This target shows the definition, coma, astigmatism, distortion, and curvature of field.

On behalf of The Society, which is always ready to lend a helping hand, I wish to express appreciation for addressing your inquiry to it, and to assure you of my personal desire and willingness, as well as my Company's, to cooperate with you in every possible way.

Respectfully yours,
E. L. HETTINGER,
Optical Research

P.S. I would suggest further that you write Dr. Gardner, National Bureau of Standards, who has had wonderful experience along these lines and can give you valuable assistance. I shall be glad to have you use my name should you write to him.

(1943)

INSTITUTE OF CERAMIC ENGINEERS

President: H. M. KRANER, Bethlehem Steel Co., Bethlehem, Pa.
Vice-President: H. B. DUBOIS, Consolidated Feldspar Corp., Trenton, N. J.
Secretary: H. G. SCHURECHT, New York State College of Ceramics, Alfred, N. Y.
Past-President: E. H. FRITZ, Stupakoff Ceramic & Mfg. Co., Latrobe, Pa.
Trustee Representative: H. G. WOLFRAM, Porcelain Enamel & Mfg. Co., Baltimore, Md.

DEFERMENT OF CERAMIC ENGINEERS

A Letter by H. M. Kraner, President

It is the object of this letter to call attention to an article by N. W. Taylor, Chairman of the Ceramic Educational Council, which appeared in *The Bulletin* for November, 1942. Also, an article by A. S. Watts in *The Bulletin* for January, 1943, represents the results of his survey of the demand and supply of ceramic engineering graduates (see also article immediately following this letter). These articles indicate that the likelihood of our obtaining ceramic engineers for our industries is not very promising. It would seem to indicate further that if we are not to be crippled by the severe drain of our engineers into the military services, we shall have to do what we can to maintain our engineering personnel.

Occupational Bulletin No. 34 of the Selective Service System (see the January *Bulletin*, p. 15) lists engineers, professional and technical, as one of the critical occupations. Although this bulletin does not mention ceramic engineers as such, it is probably the best that we can expect as recognition at the present time or for the near future. In spite of the listing of engineers in such bulletins, each case of deferment of this sort must stand on its own merits. Colonel Battley, of the Selective Service System, has stated, however, in correspondence with this Institute, that should local draft boards refuse to give due consideration to worthy cases, these cases should be brought directly to his attention. It is therefore recognized by these agencies that the contribution of the engineer to the industry is vital to that industry's contribution to the war effort. It would seem, therefore, that wherever a justifiable case exists we should not consider it unpatriotic to ask for deferment of our engineers. If the Institute can be of assistance in such cases, your officers will be glad to help.

February 1, 1943 —H. M. KRANER, *President*

DEMAND AND SUPPLY OF CERAMIC ENGINEERING GRADUATES*

Between October 1 and December 31, 1942, the ceramic engineering departments of American universities report requests from essential industries for 49 graduates of which 12 were supplied. Of these 9 were provided through transfer from nonessential industries and 3 from recent graduates.

All requests have been catalogued and where the same request went to more than one school, the duplication has been eliminated. The distribution of demand is as follows: cement 8, dinnerware 5, glass 5, porcelain enamel 15, porcelain (electrical) 7, porcelain (special) 18, refractories 34, sanitary ware 3, and technical supplies 5%.

The search for available men from nonessential industries has practically exhausted this source, and unless

* The previous report published on p. 16 of the January, 1943, *Bulletin*, was submitted November 1, 1942.

men can be made available from the students completing their education, we can offer no solution.

By adding the deficit on October 1 of 138 as regards essential industries and the 37 unfilled requests of October 1 to December 31, 1942, we disclose a shortage of 175 ceramic engineers in essential industries as of January 1, 1943.

Respectfully submitted,

January 31, 1943 ARTHUR S. WATTS, *Chairman,*
Subcommittee D of Special Committee on Status of Ceramic Engineers with Selective Service Boards, American Ceramic Society

CERAMIC CURRICULUM NOT DIRECTLY APPROVED BY MANPOWER COMMISSION

Excerpts from letter from Lane Mitchell

From personal conversations with the President of the Georgia School of Technology, I gather that ceramic engineering is not a curriculum directly approved by the Army for the wartime program. I believe that chemical engineering is an approved curriculum. Unless The American Ceramic Society and the schools can get some official ruling which specifically includes ceramic engineering or which classifies ceramic engineering as some other approved branch of engineering, the ceramic schools are likely to find that their departments are effectively abolished, for there will then be no appreciable source of students. Of course, this applies only to the teaching function, not to the research end. Ceramic engineering research will probably continue in the various schools, regardless of the shutdown of classes.

I would be glad to hear immediately as to whether any steps are being taken to have ceramic engineering included in the approved Army war college program. This question has nothing to do with the previous ambiguous classification of ceramic engineering students and graduates for deferment under the draft. Apparently it will not be long before there are no occupational deferments for college students; those students in college will be in the Army (see the February, 1943, *Bulletin*, p. 52). Unless steps are taken, none will be in ceramic engineering.

—LANE MITCHELL,
Dept. of Ceramic Engineering,
Georgia School of Technology, Atlanta, Ga.

A LETTER FROM EDWARD P. McNAMARA

February 15, 1943

Dear Mr. Purdy:

Your letter of February 1 including the enclosure of Hobart Kraner's letter to the Institute of Ceramic Engineers (see preceding page) and the excerpt from Lane Mitchell's letter (see above) has just been received.

Both of these letters indicate a serious condition brought about, I believe, by a lack of understanding by our government officials of the present function and potential use of ceramic engineers, technologists, and scientists in the war effort. The processing and utilization of the nonmetallic minerals and their products are no less important to the war effort than any other primary producing industry, such as the mining, fuels, metallurgical, petroleum, basic chemical, and food industries. The modern ceramic industry is built around the trained ceramist whether he be engineer, technologist, or scientist. If these persons do not exist in sufficient quantity, the ceramic industries cannot fulfill their wartime function. Latest reports indicate a great demand (in terms of past demands) with almost no supply in sight and with every indication that the situation will become more serious.

You ask, "What can this Society do?" I am pretty well convinced that the ceramic departments or colleges and universities working as individuals cannot obtain the proper place (or, in fact, any place) for ceramic training in the general plan of war training. The initiative must come from a much more powerful and influential source. The American Ceramic Society with its Industrial Divisions and affiliates, the Institute of Ceramic Engineers and Ceramic Educational Council, is the most powerful national organization in the entire ceramic field. This Society has labored for over forty years to establish technical ceramic education in our universities. These past efforts have enabled the ceramic industries to advance technically and assume their present key position in our civilian and war economy. In my opinion The American Ceramic Society is the only agency with sufficient stature to save technical ceramic training from wartime oblivion.

With proper leadership and support, The American Ceramic Society should be able to impress upon the Army, Navy, and various civilian agencies that a minimum flow of trained ceramic engineers is of vital importance to the ceramic industries doing war work. I believe that this effort should go hand in hand with a clarification of the position of the ceramists now employed in the industry. I should like to see the officers and Board of Trustees of The Society take action on this matter. They should have the cooperation and assistance of all Divisions and affiliates of The Society as well as the trade organizations and institutes of the various ceramic industries.

I am sure that no college or university now teaching technical ceramics would hesitate to make its ceramic facilities available for a wartime training program sponsored by the government. A properly organized course of study could turn out a pretty good engineer or technologist in eighteen months, if the men were hand picked. It is up to our Society to convince the government agencies that this is the solution to a critical problem.

If after a vigorous effort Washington rules that the ceramic industries and ceramic engineers are not important enough to give consideration, then we must seek some other less effective solution. One of these, I am sure, is the utilization of evening extension courses for the upgrading of deferred employees. This is a makeshift, however, for I have never believed that persons so trained could do the job of a real engineer. It is true that they could be very valuable in testing, inspection, and control work.

As you know, I suggested to Nelson Taylor that the Ceramic Educational Council try to work out a plan for ceramic training. I believe that we can work out such a plan, but it will be of no avail if we do not have the proper industrial and professional backing and proper government recognition and support.

Even if a successful plan could be worked out, it is probable that some departments would not have sufficient students to operate. These departments might be formed into a ceramic research pool to work on ceramic war problems.

I should like to register a strong plea for action by our Society. I am certain that we can supply the plans if The Society will take the initiative.

—EDWARD P. MCNAMARA,
Assistant Professor of Ceramics,
Rutgers University, New Brunswick, N. J.

More in Evidence
Ceramic Engineers Must Be
To Warrant Draft Deferment

AMERICAN CERAMIC SOCIETY

Forty-Fifth Annual Meeting—War Congress,
Week of April 18, Pittsburgh, Pa.

LOOKING FOR TROUBLE AND INSURING AGAINST IT

\+ + +

Security Is Not Assured, Nor Can It Be Insured Except by Personal Effort

\+ + +

There Is No Permanent Right to Present or Future Enjoyment of Material Possessions or of Employment Except by Personal Endeavor

\+ + +

There Is No Permanent Protection of Vested Interests Nor Can Personal Inertia Be Overcome by Outside Forces

THERE MUST BE A SELF-MOTIVATING POWER

Only by Diligent Research and Application Can Ceramic Technologists Succeed

PAID MEMBERSHIP AND SUBSCRIPTION RECORD

Date of Record	Members Paid		Deferred	Subscriptions	Monthly Sales	Total Circulation
	Personal	Corporation				
December 19, 1939	1876	237	27	642	220	3002
December 20, 1940	1995	260	25	574	220	3074
December 21, 1941	2029	257	37	609	220	3152
December 21, 1942	2088	270	15	446	220	3039
January 21, 1943	2079	267	11	444	220	3021
February 21, 1943	2095	267	10	451	220	3043

THE AMERICAN CERAMIC SOCIETY, INC.

Personal Membership $12.50 per year
Corporation Membership $25.00 per year minimum

(1943)

ROSTER CHANGES FOR FEBRUARY*

ANDERSON, GEORGE H., Lone Star Steel Co., Daingerfield, Texas (Dallas, Texas)
ARNOLD, R. E., 1431 N. Pacific Ave., Glendale, Calif. (Pottstown, Pa.)
BAKER, JOSEPH, R. F. Sedgeley, Inc., "J" & Ontario Sts., Philadelphia, Pa. (Hatboro, Pa.)
BATES, H. CLIFFORD, Research Enterprises, Ltd., Leaside, Ontario, Canada (Toronto, Ontario, Canada)
CAITO, A/C A. M., AAFTS, Group 2, Room 2621, Entrance O, Sterling Hall, Yale University, New Haven, Conn. (Maple Grove, Ohio)
DEVOL, M. LEE, Anthracite Industries Lab., Primos, Delaware County, Pa. (Pittsburgh, Pa.)
FISHER, HELEN, Metuchen Inn, Metuchen, N. J. (Columbus, Ohio)
FORST, EDWARD, JR., 2820 S. Spaulding Ave., Chicago, Ill. (Lancaster, Ohio)
GENTRY, RAYMOND, Ball Brothers Co., Muncie, Ind. (Henryetta, Okla.)
LIMES, 1ST LT. ROBERT W., 41st Sig. Cons. Bn., Camp Forrest, Tenn. (Deal, N. J.)
MCALPINE, KENNETH B., 1017 Carlisle St., T[illegible]ctum, Pa. (Pittsburgh, Pa.)
MERWIN, BYRON W., 2505B St. Clair Ave., [illegible]erpool, Ohio (Roseville, Ohio)
MOREY, G. W., Geophysical Lab., 2801 Upton [illegible]., Washington, D. C. (Parkersburg, W. Va.)
PARK, FRANK A., JR., Midland Hotel, Midland, Pa. (Darlington, Pa.)
PATTON, WILLIAM R., 2416 Deming Ave., Columbus, Ohio (Dover, Ohio)
ROLLFS, EDWARD H., 13020 Pullman St., Wyandotte, Mich. (Detroit, Mich.)
ROTH, H. A., 406 West End Ave., Haddonfield, N. J. (Camden, N. J.)
STEWART, JOHN A., c/o S. E. Stewart, 605 S. Sixth St., Vandalia, Ill. (Washington, Pa.)
THOMAS, SAMUEL L., JR., 948 N. Negley Ave., Pittsburgh, Pa. (Westfield, N. J.)
VAIL, JAMES G., 502 W. Front St., Media, Pa. (Philadelphia, Pa.)
VEAZIE, F. MUNRO, Laboratory, Corning Glass Works, Corning, N. Y. (Newark, Ohio)

* Address in parentheses is former address.

NEW MEMBERS IN FEBRUARY

Corporation

MESSRS. MOLER PRODUCTS, LTD., Hythe Works, Colchester, Essex, England.

Personal

BENNETT, FREDERICK R., Box 325, Hartsville, S. C.; manager, Carolina Refractories Co.
BIDWELL, GEORGE E., 605 W. Martin St., Abingdon, Ill.; superintendent, Art Ware Division, Abingdon Sanitary Mfg. Co.
CROSSAN, WILLIAM A., R. D. 3, Canton, Ohio; superintendent, National Fireproofing Corp.
HANDWERK, JOSEPH H., 301 Josephine, Flint, Mich.; student engineer, AC Spark Plug Co.
HATCH, J. W., 713 N. Main St., Abingdon, Ill.; vice-president, Abingdon Sanitary Mfg. Co.
HEDDEN, WALTER A., Box 981, Alfred, N. Y.; research ceramist, New York State College of Ceramics, Ceramic Experiment Station.
HOCKING, WILLIAM J., 1612 Pennsylvania Ave., East Liverpool, Ohio; purchasing agent, Hall China Co.
JOHNSON, ARNOLD, 2273 Glenwood Ave., Toledo, Ohio; glass technologist, Libbey-Owens-Ford Glass Co.
PERTUCH, WALTER A. R., Franklin Institute, Philadelphia, Pa.; research librarian.
RAY, JOHN G., 31 East 4th St., Emporium, Pa.; glass technologist, Sylvania Electric Products, Inc.
ROLLASON, E. C., Murex Welding Processes, Ltd., Hertford Rd., Waltham Cross, Hertfordshire, England; research manager.
STYER, CHARLES A., 11 Roxbury Rd., Forest Hills, Pittsburgh-21, Pa.; ceramic engineer, Vesuvius Crucible Co., Swissvale, Pa.
TOULOUSE, JULIAN H., 1817 Potomac Dr., Toledo, Ohio; chief service engineer, Owens-Illinois Glass Co.
WILLIAMS, ALAN B., 30 S. Park Place, Painesville, Ohio; chemical engineer, Diamond Alkali Co.
WOOD, JOSEPH L., Magnesium Plant, Mathieson Alkali Works, Lake Charles, La.; assistant superintendent, Electrolytic Department.
WRIGHT, J. E., Messrs. A. G. Hackney & Co., Ltd., Fairfield Pottery, Hanley, Stoke-on-Trent, England; managing director.

Student

Cleveland School of Art: OLGA M. GAST.
Missouri School of Mines and Metallurgy: LEON B. SCHWAB.
Virginia Polytechnic Institute: CHARLES R. VENABLE.

MEMBERSHIP WORKERS' RECORD

Corporation

Felix Singer 1

Personal

F. L. Arensberg	1	H. G. Elledge	1
R. E. Bidwell	2	S. E. Lull	1
R. E. Birch	1	T. N. McVay	1
U. E. Bowes	1	R. W. Ricker	1
B. C. Burgess	1	R. A. Shipley	1
R. M. Campbell	1	Felix Singer	1
R. F. Doran	1	Office	2

Student

P. S. Dear	1	P. G. Herold	1
	Mrs. A. R. Dyer 1		
		Grand Total	**20**

PROPOSED RULES OF THE STRUCTURAL CLAY PRODUCTS DIVISION OF THE AMERICAN CERAMIC SOCIETY*

Article SR I. Name

The official title of this Division shall be The Structural Clay Products Division of THE AMERICAN CERAMIC SOCIETY.

Article SR II. Purpose

It shall be the purpose of this Division to stimulate the growth and activities of THE SOCIETY in the arts and sciences pertaining to the branch or branches of the ceramic industry represented in the Division enrollment.

Article SR III. Membership

(1) The Structural Clay Products Division shall consist of those Fellows, Members, Corporation Members, and Life Members of these grades in good standing whose major interest lies within the field covered by the Division and who have instructed the General Secretary of THE SOCIETY to so enroll them.

(2) The following members in good standing enrolled

* These rules will be considered for adoption at the next annual meeting of the Structural Clay Products Division to be held during the week of the Annual Meeting of The American Ceramic Society, April 18–22, 1943, in Pittsburgh, Pa.

in this Division shall be entitled to vote: Fellow, Member, Voter of Corporation Member, and Life Member of these grades.

(3) The following grades of members in good standing enrolled in this Division shall be entitled to hold office: Fellow, Member, and Life Member of either grade.

Article SR IV. Government

(1) The affairs of this Division shall be directed by an Executive Committee comprised of the elected Chairman, Vice-Chairman, Secretary, and Trustee.

(2) The term of office of the Chairman, Vice-Chairman, and Secretary shall be one year, to wit: from the close of one Annual Meeting of THE SOCIETY until the close of the next succeeding Annual Meeting, or until their respective successors shall have been elected and duly qualified. The term of office of the Trustee representative of the Division shall be three years, to wit: from the close of one Annual Meeting of THE SOCIETY until the close of the third successive Annual Meeting of THE SOCIETY, or until his successor has been elected and duly qualified.

Article SR V. Meetings

(1) The annual meeting of this Division shall be held during the week of the Annual Meeting of THE SOCIETY. The annual business meeting shall be an item on The Division program and the time of the meeting shall be conspicuously posted on the Division bulletin board.

(2) Fifteen (15) voting members of this Division shall constitute a quorum at any business meeting.

(3) Special business meetings may be called by any three (3) of the Division Executive Committee or by petition of ten (10) voting members on thirty (30) days' notice.

Article SR VI. Officers

(1) The Division Chairman shall have general supervision of the affairs of the Division. He shall preside, or, in the event of the refusal or inability of the Vice-Chairman, shall appoint a substitute to preside at all meetings of the Division or of the Division Executive Committee. He shall be a member of the Committee on Sections and Divisions of THE SOCIETY. He shall not be eligible for re-election within a period of five years.

(2) The Vice-Chairman shall assist the Chairman as requested and shall succeed to the powers and duties of the Chairman in the event of the refusal or incapacity of the Chairman to perform them.

(3) The Secretary shall keep minutes of all Division business meetings and, after approval by the Division Executive Committee, shall promptly file a report of a meeting with the Editor of *The Bulletin* of THE SOCIETY for publication. He shall keep a full record of the correspondence of the Division.

(4) Any vacancies in the Division Executive offices occurring during the year shall be filled by appointment by the remaining members of the Division Executive Committee. A member so appointed shall not forfeit the privilege of election to any Division office.

Article SR VII. Nominations and Elections

(1) (*a*) It shall be the duty of the Division Nominating Committee to make two nominations for each of the following, to wit: (1) Chairman, (2) Vice-Chairman, and (3) Secretary. The names of the nominees together with their acceptance in writing shall be certified to the Chairman of the Division by the Nominating Committee at least ninety (90) days prior to the starting date of the Annual Meeting of THE SOCIETY.

(*b*) The Division Nominating Committee, functioning during the year prior to the Annual Meeting of THE SOCIETY at which the triennial term of the Division Trustee representative expires, shall include on its slate of nominations the names of nominees for the office of Division Trustee representative.

(2) Additional nominations may be made by petition in writing of fifteen (15) voting members, providing the petition accompanied by the nominees' acceptance in writing is received by the Division Chairman ninety (90) days prior to the starting date of the Annual Meeting of THE SOCIETY.

(3) (*a*) The Division Chairman shall promptly transmit the nominations to the General Secretary of THE SOCIETY, who shall submit ballots by mail to the voting members of the Division at least sixty (60) days prior to the starting date of the Annual Meeting of THE SOCIETY.

(*b*) The ballots shall bear the names of nominees and a closing date of the voting not less than thirty (30) days prior to the starting date of the Annual Meeting of THE SOCIETY. The ballots shall be sent out in a plain envelope marked only with the words, "Division Ballot." This envelope shall be enclosed in another envelope for mailing, upon the back of which the voter shall endorse his name. Only those ballots so returned thirty (30) days before the opening date of the Annual Meeting of THE SOCIETY shall be counted.

(*c*) The ballots shall be mailed from the office of THE SOCIETY, returned to the office of THE SOCIETY, and counted by authorized representatives of THE SOCIETY, except that when so decided by the current Division Executive Committee the returned ballots shall be transmitted to the Division Chairman, who shall have them counted immediately after the close of voting and shall transmit the results of the election to the General Secretary of THE SOCIETY and the Editor of *The Bulletin*.

(*d*) A plurality of the votes cast shall constitute election.

(4) In the event of refusal to act or incapacity to act of the Division Trustee representative, a successor to fill the unexpired term shall be selected promptly by agreement of the majority of the other members of the Division Executive Committee. The appointee's name and acceptance in writing shall be promptly transmitted to the General Secretary of THE SOCIETY by the Division Chairman.

Article SR VIII. Relations with The Society

(1) As soon as possible after each Annual Meeting of THE SOCIETY, the Division Chairman shall fill all vacancies of the Standing Committees of THE SOCIETY as currently required by the By-Laws and Rules of THE SOCIETY.

(2) The Division Chairman shall promptly appoint Division representatives to special committees of THE SOCIETY upon proper notification by THE SOCIETY.

(3) The Division shall not expend funds of THE SOCIETY or incur indebtedness without the formal approval of the Board of Trustees of THE SOCIETY.

(4) The provisions of the Constitution, By-Laws, and Rules of THE SOCIETY shall govern the procedure of this Division, but no action or obligation of the Division shall be considered an action or obligation of THE SOCIETY. This By-Law shall be imprinted on any publication issued by the Division.

(5) Authorization for incurring indebtedness by the Division for a purpose which has been approved by the Board of Trustees of THE SOCIETY shall be obtained by a majority of the members voting on a ballot which shall state the purpose and amount of the proposed expenditure and the agreement of the voter to a stipulated maximum assessment to liquidate the indebtedness. Such assessment shall be collected by THE SOCIETY and credited to the account of the authorized indebtedness.

(6) Special funds to be expended for an approved purpose may be collected by the Division or an authorized committee thereof. Such funds shall be deposited with THE SOCIETY, held in a special account, and paid out by THE SOCIETY for the authorized purpose in a manner currently agreed upon by authorized representatives of the Division and THE SOCIETY.

Article SR IX. Committees

(1) The Standing Committees of the Division shall be as follows:

(*a*) Nominations
(*b*) Editorial
(*c*) Papers and Program
(*d*) Membership
(*e*) Standards
(*f*) Research
(*g*) Education
(*h*) Data
(*i*) Rules
(*j*) Industrial Management

(2) The Nominating Committee shall consist of three members appointed by the incoming Division Chairman, the first named to be Chairman. They shall serve one year and are not eligible for re-election prior to the third succeeding year. Their duties are to present nominees for the offices of the Division as provided in Article SR VII.

(3) The Editorial Committee shall consist of a Chairman and two members, one new member being appointed each year by the incoming Division Chairman for a period of three years. The senior member shall be Chairman of the Committee in his final year. A retiring member shall be eligible for immediate reappointment as an incoming member. It shall be the duty of this Committee to act in cooperation with the Editor of the publications of THE SOCIETY and the Committee on Publications of THE SOCIETY as the By-Laws and Rules of THE SOCIETY may currently specify.

(4) The Committee on Papers and Program shall consist of a Chairman appointed by the incoming Division Chairman and two members chosen by the Committee Chairman. They shall serve one year and are eligible for immediate reappointment. It shall be the duty of this Committee to solicit technical papers and arrange the program of technical meetings of the Division.

(5) The Committee on Membership shall consist of a Chairman appointed by the incoming Division Chairman and two members chosen by the Committee Chairman. They shall serve for one year and are eligible for immediate reappointment. It shall be the duty of this Committee to increase the membership of the Division.

(6) The Committee on Standards shall consist of a Chairman appointed by the incoming Division Chairman. He shall serve for one year and be eligible for immediate reappointment. He shall assist in the development of such standard specifications for materials, products, and tests as may be currently authorized by THE SOCIETY or the Division.

(7) The Committee on Research shall consist of a Chairman appointed by the incoming Division Chairman. He shall serve for one year and be eligible for immediate reappointment. He shall represent the Division in matters pertaining to research activities of the Division and assist in such research activities of THE SOCIETY as permit of Division cooperation.

(8) The Committee on Education shall consist of a Chairman appointed by the incoming Division Chairman. He shall serve for one year and be eligible for immediate reappointment. He shall assist the Committee on Ceramic Education of THE SOCIETY as instructed in matters which may currently require Division representation.

(9) The Committee on Data shall consist of a Chairman appointed by the incoming Division Chairman. He shall serve for one year and be eligible for immediate reappointment. He shall assist the Committee on Data of THE SOCIETY as instructed in matters which may currently require Division representation.

(10) The Committee on Rules shall consist of a Chairman appointed by the incoming Division Chairman. He shall serve for one year and be eligible for immediate reappointment. He shall assist the Committee on Rules of THE SOCIETY as instructed on matters which may currently require Division representation.

(11) The Committee on Industrial Management shall consist of a Chairman appointed by the incoming Division Chairman. He shall serve for one year and be eligible for immediate reappointment. He shall assist the Committee on Industrial Management of THE SOCIETY as instructed in matters which may currently require Division representation.

(12) The Chairmen of Committees on Membership, Standards, Research, Rules, and Data may request assistants who on approval of the Division Executive Committees shall be chosen by the Committee Chairman.

(13) A Chairman of a Standing Committee of the Division shall represent the Division on the corresponding committees of THE SOCIETY.

(14) Any temporary Division Committee authorized by the Division shall be appointed by the Division Chairman for one year. A temporary Committee may be reauthorized by the Division and its members shall be eligible to immediate reappointment.

Article SR X. Amendments

(1) Amendment to these Division Rules may be proposed by petition signed by fifteen (15) voting members of the Division and presented to the Division Chairman.

(2) The Division Chairman shall promptly ascertain by written communication from the proper authority of THE SOCIETY whether the proposed amendment is consistent with the Constitution, By-Laws, and Rules of THE SOCIETY and, if so, it shall be voted upon by ballot.

(3) A two-thirds majority of the votes cast shall be necessary to carry an amendment.

PERSONAL NOTES

ARTHUR F. GREAVES-WALKER'S NEW JOB

Dr. Greaves-Walker has been transferred to the Office of Production Research and Development, WPB, as deputy chief of the Metals and Minerals Branch. The setup of the new office is similar to an engineering experiment station and was organized to handle all researches, except those on arms and munitions, connected with the war effort. The office has its own building at 420 5th St., N.W., Washington, D. C.

Dr. Greaves-Walker has been serving as chief of the Nonmetals Section of WPB.

NORBERT J. KREIDL

Norbert J. Kreidl has been appointed to take charge of the Inorganic Chemistry and Glass Research Division of the Chemical Laboratories, Bausch & Lomb Optical Co., Rochester, N. Y. He assumed his new duties February 1, 1943.

Biography

Dr. Kreidl was born in a small town near Vienna, Austria, July 3, 1904, the son of Ignaz and Hilda Krenn Kreidl. In 1927, he was graduated from the University of Vienna, where he obtained his Ph.D. degree in physics and chemistry (major and minor, respectively). He also attended the University of Berne, Switzerland.

Following his graduation from the University of Vienna, Dr. Kreidl became associated with the Silicate Institute at Berlin-Dahlem, where he worked on barium silicate glasses under the direction of Woldemar A. Weyl, now professor in the Department of Ceramics at the Pennsylvania State College, State College, Pa. This collaboration was continued when Dr. Kreidl became affiliated in 1928 with Sklarne Hute drive Schreiber a Synovce, a leading Czechoslovakian glass company which operates plants in the Czechoslovakian provinces of Moravia and Slovakia. Here he established a research laboratory in close cooperation with the Glass Institute of the Czechoslovakian Republic, which had just been founded under

the direction of Vaclav Ctyroky and in the organization of which both Dr. Weyl and Dr. Kreidl had participated. In his laboratory work, Dr. Kreidl was chiefly interested in the chemistry of glass, stressing problems of an optical character, and was engaged in work on color and opacity as well as in the study of illumination. At the same time, he kept in touch with manufacturing and held an executive position representing family interests in the glass company, the products of which are better known in the United States under the trade name Emeralite.

During this time, Dr. Kreidl traveled extensively in England, Belgium, Holland, France, Switzerland, Italy, and Jugoslovia, both for pleasure and to gain a better understanding of the trends in the glass industries in these countries. He also participated in the founding of the Czechoslovakian Society of Glass Technology and aided a group of Czechoslovakian glassmen in organizing their industry at the New York World's Fair.

Norbert J. Kreidl

In 1934, Dr. Kreidl married Melanie Schreiber, the daughter of a neighboring lumberman who was the descendant and relative of such Bohemian glass families as the Schreibers, the Kraliks, and the Welzes.

Deciding to settle in the United States, the Kreidls came to Pennsylvania, where Dr. Kreidl became affiliated with the Ceramic Department of the School of Mineral Industries of the Pennsylvania State College, State College, Pa. As an assistant professor, he supervised ceramic thesis work, but his chief assignment was to take charge of various industrial fellowships. After completing a series of large-scale experiments on the chemistry of opal glasses in Dunkirk, N. Y., he confined his work mainly to the supervision of the fellowship of the Monsanto Chemical Company; in this task, he was concerned with the function and the applications of phosphorus compounds in the various fields of ceramics.

Dr. Kreidl has been a member of The American Ceramic Society since 1939. He is also a member of the Society of Glass Technology (England) and of Sigma Xi.

Ceramic Background

Dr. Kreidl's father, Ignaz Kreidl, is well known as a research chemist and ceramist as well as an industrialist and has been responsible for many new chemical and ceramic processes and for the establishment of various factories in these fields. His patents on enamel opacification by zirconium compounds (1911) and by gas bubbles (1928) are best known to ceramists. He has also been equally active in the fields of glass, plastics, saccharine, insecticides, and rare earths. He is still active in research and collaborates with another son, Werner Kreidl, in the Kreidl Chemico-Physical Corporation of New York. His third son, Ekkehard Kreidl, a patent and research physicist and ceramist, is affiliated with the Arthur D. Little Co., Cambridge, Mass. They are all members of The American Ceramic Society.

Publications of N. J. Kreidl

(1) "Use of the Geiger Counter for Experiments on the Disintegration of Atoms," *Ger. Akad. Wiss. Vienna, IIa*, 136 [8] (1927).

(2) "Basic Oxides and Glass Properties," *Glass Ind.*, **11** [2] 25–28 (1930); translated from *Glastech. Ber.*, **7** [8] 313–17 (1929).

(3) (With W. A. Weyl) "Photometric Measurements in Industrial Laboratories," *Sklářské Rozhledy*, **9** [4] 51–60 (1932).

(4) (With W. A. Weyl) "Opal Glass," *Glass Ind.*, **21** [2] 57–62, 82 (1940).

(5) (With N. W. Taylor) "Use of Low-Melting Model Substances for the Demonstration of Silicate Glass Properties," *Proc. Penna. Acad. Sci.*, **15**, 35–38 (1941).

(6) "Fluxing Properties of Lithia," *Foote-Prints*, **14** [1] 1–11 (1941).

(7) (With B. F. Trumm and R. F. Scott) "Electrolytical Replacement of Sodium by Ammonium in Glass," *Jour. Amer. Ceram. Soc.*, **24** [7] 225–28 (1941).

(8) (With W. A. Weyl) "Phosphates in Ceramic Ware: III, Phosphorus Compounds as Reducing and Fining Agents in Glass," *ibid.*, [10] 337–40; "IV, Phosphate Glasses," *ibid.*, [11] 372–78; *Penn. State Coll., Mineral Ind. Expt. Sta. Tech. Paper*, No. 72.

(9) "Possibilities of Strontia in Ceramics," *Foote-Prints*, **14** [2] 15–25 (1941).

(10) "Zirconium Oxide and Thorium Oxide in Ceramics," *Jour. Amer. Ceram. Soc.*, **25** [5] 129–40 (March, 1942).

(11) "Rare Earths," *ibid.*, pp. 141–43.

(12) (With Edward Forst, Jr.) "Red Silver Glasses," *ibid.*, [10] 278–80 (June).

(13) (With P. M. Corbett) "Development of Leadless Glazes Containing Fluorides," *Ceram. Ind.*, **39** [2] 46–50; [3] 64–68 (1942).

(14) (With W. A. Weyl) "Development of Low-Melting Glasses on the Basis of Structural Considerations: I–IV," *Glass Ind.*, **23** [9] 335–37, 357; [10] 384–86, 402–403; [11] 426–28, 441; [12] 465–67, 480 (1942).

Patents

(1) "Improvements in Reflectors, etc.," Brit. 384,883, April 8, 1932.

(2) "Protection of Reflector Surfaces," Brit. 404,595, April 9, 1932.

(3) "Changeant or Opalescent Glass" (Glashüttenwerk vorm. J. Schreiber und Neffen, assignee), U. S. 1,899,760, Feb. 28, 1933.

(4) "Process for Producing Colored Coatings of Glass," U. S. 1,947,781, Feb. 20, 1934.

Foundation Is Important—Efficient Operation Is Required—Constant Upkeep Is Essential
— Continuing Investment by Persons as well as by Manufacturing Plants
Forty-Fifth Annual Meeting War Congress, Week of April 18, Pittsburgh, Pa.

NEW YORK STATE COLLEGE OF CERAMICS

News Items

The New York State College of Ceramics, Alfred, N. Y., is one of the 281 American colleges selected by the government for the training of service men at government expense. It is expected that these service men will preempt the facilities of the College.

Governor Dewey has approved and presented to the legislature substantial increases in salaries for the staff of the College and also large increases for operation.

Beginning this summer the college year will extend throughout the year, enabling students to graduate in three years.

The College has lost a number of students for military service, but the enrollment is still 262.

The students are now busily engaged in preparation for the annual St. Pat's celebration which is to be held March 18 and 19. Ceramic engineers will be welcome as guests.

The staff is also busily engaged in preparing papers for The American Ceramic Society Annual Meeting—War Congress. The senior students are also making their plans to attend.

Student Branch

The January meeting of the Student Branch was held January 26 with President Francis J. DiLaura presiding. Other officers for the current school year are Wilfred Clay, *Vice-President;* Guy E. Rindone, *Treasurer;* and Robert Sinclair, *Secretary.* There was a large turnout of students of the Ceramic Engineering Department at the meeting. Grover W. Lapp of the Lapp Insulator Co., Le Roy, N. Y., gave an interesting talk on "Insulators." Mr. Lapp supplemented his talk by showing samples of some of the special shaped insulators made in his plant. After the talk, Mr. Lapp's two engineers, K. E. Stettinius and B. F. Dewey, former Alfred students, answered questions which confronted the student body.

Preceding the meeting, a dinner was held in the Coffee Shop for the speaker and his engineers. The dinner was attended by the officers of the Student Branch and the faculty of the New York State College of Ceramics.

J. T. Littleton, assistant director of research, Corning Glass Works, Corning, N. Y., spoke at the February meeting.

The Alfred Engineer

The staff of the *Alfred Engineer* is working on the second edition of the school paper, which is put out by the student engineers of the New York State College of Ceramics and published four times a year. It carries news of the student organizations, activities, and research work and alumni news. The staff of the paper consists of Walter East, *Editor-in-Chief;* Leroy Greenspan, *Managing Editor;* Arthur Powell, *Business Manager;* John Baker, *Advertising Manager;* and Francis J. DiLaura, *Circulation Manager.*

Keramos

Since the beginning of the school year, the chapter of Keramos at the New York State College of Ceramics has shown considerable progress in its schedule of projects, monthly meetings, and discussions under the supervision of President Lawrence Bickford. During the fall semester, several projects were drawn up and approved by the fraternity and members were appointed to committees to direct each project.

A project to catalogue the books and publications of the Ceramic Library so that references could be easily obtained was formulated and approved. Walter East and Benny Soldano were appointed as cochairmen in charge of the work.

John Boros accepted the responsibility of preparing a White Paper to show draft boards the value of ceramic engineers in the war effort. Mr. Boros has been called into the armed services, however, so work on this project has been delayed temporarily.

A project to provide "frosh" orientation talks and discussions before each Student Branch meeting was also approved. At these discussions, members of Keramos will give explanations and descriptions of the more important points of the subject matter of each forthcoming Student Branch program. In this manner, the freshmen and sophomore engineers will be more versed in the important particulars of each program.

At the January meeting, a committee was appointed to consider a movie program covering some phase of ceramics which will be sponsored by Keramos in the near future for the benefit of the student body.

During the course of the semester, two new faculty members, William Crandall and H. D. Foster, were initiated into Keramos.

—ROBERT SINCLAIR, *Secretary, Student Branch*

NECROLOGY

GEORGE H. BROWN

George H. Brown, professor in the Department of Ceramics, Rutgers University, New Brunswick, N. J., died February 8, 1943, in St. Petersburg, Fla.

A photograph of Professor Brown and biographical sketch were published in the March, 1936, *Bulletin,* page 102.

CLARENCE A. HALL

Clarence A. Hall, an active member of The American Ceramic Society since 1917, died July 20, 1942.

Mr. Hall was a graduate of the University of Pennsylvania, with a degree in chemistry. At the time of his death he was chairman of the Board of the Bartol Research Foundation and assistant treasurer of the Franklin Institute.

A noted chemical engineer, he was a member of many other scientific and technical societies. He was affiliated with the Electric Storage Battery Co., Philadelphia, Pa., and was treasurer of the Board of Trustees of the Philadelphia Presbytery North.

EDWIN M. KNOWLES

Edwin M. Knowles, president of the Edwin M. Knowles China Co., Newell, W. Va., and of the Potters Supply Co., East Liverpool, Ohio, died February 9, 1943, at his home in Newell following a long illness. His death ended a long career of association with pottery manufacturing and the business life of East Liverpool.

Mr. Knowles was born in East Liverpool, Ohio, the son of Isaac and Rebecca Knowles. His father, founder of the Knowles, Taylor and Knowles Company, was one of the pioneer potters of the town.

He attended the Poughkeepsie, N. Y., military academy, Allegheny College, Meadville, Pa., and Harvard University, Cambridge, Mass.

His first venture in business came when, with George H. Owen and Frank Croxall, he founded the insurance company of George H. Owen Company.

In 1890, Mr. Knowles assumed control of the Potters Supply Company and in 1899 erected the Edwin M. Knowles China Company in Chester, W. Va. A second plant of the dinnerware firm was built in Newell in 1914.

He served as president of the United States Potters Association in 1911 and was a member of various committees.

Mr. Knowles was a member of the First Methodist Church of East Liverpool and during the first World War was active in Red Cross duties, serving as president of the East Liverpool chapter.

He is survived by his widow, Katherine Durflinger Knowles; a brother, Willis A. Knowles, Santa Barbara, Calif.; and a sister, Mrs. Joseph G. Lee, Berkeley, Calif.

★ CAPTAIN ALLEN K. PORTER ★

Captain Allen K. Porter, a student member of The American Ceramic Society from 1936 to 1938, died at Camp Maxey, Texas, October 19, 1942.

Captain Porter was graduated in ceramic engineering in June, 1937, from the University of Illinois, Urbana, Ill., where he was a member of the Student Branch of The American Ceramic Society for four years and secretary-treasurer his senior year. Following graduation, he started working on July 6 in the Melting Department of the Corning Glass Works, Corning, N. Y., under the direction of W. W. Oakley.

Captain Allen K. Porter

Called to service as a reserve officer December 10, 1940, Captain Porter remained in the Army until December 8, 1941, when he resumed his work at the Corning Glass Works. On December 29, he was recalled to active service at the Engineer Replacement Center, Fort Belvoir, Va. He later received his commission in the Engineering Corps.

Captain Porter married Miss Helen Brunzda October 19, 1940. Miss Brunzda was a home economics expert and was on the staff of the Test Kitchen at the Corning Glass Works until her husband was called to service.

WILLIAM E. DOUGLASS

William E. Douglass, manager of the Panhandle Division of the Monongahela West Penn Public Service System, Wellsburg, W. Va., died of a heart attack November 7, 1942, at his home in Wellsburg.

Mr. Douglass was born in Elmwood, Ill., April 29, 1890, a son of the late Edwin and Nellie Houser Douglass. He attended the Illinois public schools, Knox College, Galesburg, Ill., and the University of Arkansas School of Engineering, Fayetteville, Ark.

He had been associated with the Westinghouse Electric & Mfg. Co., Pittsburgh, Pa., and the Wisconsin Valley Electric Co., Wausau, Wis., before becoming affiliated with the Monongahela West Penn Public Service System in May, 1925.

Upon becoming head of the Company's Wellsburg offices in September, 1932, Mr. Douglass took an active part in Wellsburg civic and church life, and through his endeavors the Company made marvelous progress in the town and rural districts.

Mr. Douglass manifested deep interest in the youth of the community and through his efforts numerous events for their betterment were sponsored. He was one of the principal organizers of a strong Boy Scout movement in Wellsburg and served one term as chairman of the Brooke District Boy Scouts of the Fort Steuben area and was serving another term when he was overtaken by illness.

He was affiliated with Christ Episcopal Church and served on the Board of Vestrymen and at the time of his death was a trustee.

He was an active member of the Kiwanis Club, the Masonic Order, and of Wellsburg Lodge No. 1553, B.P.O. Elks and was one of the founders of the Brooke County Safety Council, an organization which for several years has devoted time and effort to teaching practices of safety in schools, homes, and industry. He was a member of Phi Delta Theta fraternity.

Mr. Douglass' hobby was music, and as an ardent music lover he was a most loyal supporter and advocate of music within the county.

He had become a member of The American Ceramic Society in 1942.

HAROLD OTIS BOSWORTH

Harold Otis Bosworth, president of the Denver Fire Clay Co., Denver, Colo., died January 31, 1943, following an emergency operation.

Mr. Bosworth was born in Denver July 7, 1880, the son of Leonora and Joab Otis Bosworth. The father, who had gone to Denver in 1871 and started a drug business with William A. Hover, had discovered valuable clay deposits near Golden, Colo., a few years later and in 1878 had founded the Denver Fire Clay Company. One of the first to develop the use of flashlight powder for making photographs, he was killed in 1890 when powder with which he was working in his laboratory exploded.

Training himself to succeed his father in the clay industry, Harold Bosworth was graduated in 1898 from East High School in Denver and in 1902 from the Massachusetts Institute of Technology, Cambridge, Mass., where he studied chemical and mechanical engineering.

From 1902 to 1909, he was factory superintendent for the Denver Fire Clay Company. From 1910 to 1912, he was associated with the Mine & Smelter Supply Company. In 1912 and 1913, he was manager of the Allentown Brick Co., Allentown, Pa., and in 1916–1917, he was manager of the White Tar Co., Jersey City, N. J. In 1918, he returned to Denver to become the president of the Denver Fire Clay Company, the position he held at the time of his death.

A man of wide interests and humane sensibilities, Mr. Bosworth served on many committees of the Denver Community Chest and was a director for many years of the Goodwill Industries of Denver. He was a leading member of the Chamber of Commerce and as the regional representative for the alumni of the Massachusetts Institute of Technology directed the awarding of many scholarships to Colorado youths. In 1926, he was elected to the Denver school board and served a short time.

Mr. Bosworth was a member of the Denver Club, the Denver Country Club, the Technology Club, and Sigma Alpha Epsilon. He was a Presbyterian.

Harold Otis Bosworth

He is survived by his widow; two sons, Otis B. Bosworth, now attached to the American Embassy at Quito, Ecuador, and Richard B. Bosworth, Denver; and a daughter, Mrs. David K. Spitler, Cleveland, Ohio.

L. GEORGE WASSMAN

L. George Wassman, chief chemist of the Pacific Enamel Works of the American Radiator & Standard Sanitary Corporation, Richmond, Calif., died suddenly of a heart attack January 3, 1943, at his home in Berkeley, Calif.

Mr. Wassman was born March 12, 1887, at Vesternorlands Län, Sweden. He was graduated from the University of Stockholm at the age of twenty. He then took post-graduate work at the Tekniska Institut at Hernosand, Sweden, and was graduated with high honors in 1911. After graduation, he was employed by an electrical manufacturing company as a sales engineer and traveled in Continental Europe.

Mr. Wassman came to the United States in the spring of 1914 and resided in Chicago, Ill. He worked in the Great Lakes iron ore industry as a chemist and for the Stewart Warner Manufacturing Company in a chemical and metallurgical capacity. He was a consulting mining engineer for the Canadian Government before his entry into the United States Army May 30, 1918. After the Armistice in World War I, he took a position with the Wolf Manufacturing Company, Chicago, Ill., as chief ceramist.

He was married November 6, 1918, to Martha Glaza of Bay City, Mich., and moved to California April 28, 1925, where he became chief chemist for the Pacific Sanitary Manufacturing Company, which company was later absorbed by the American Radiator & Standard Sanitary Corporation.

Mr. Wassman was well known in ceramic circles and had been a member of The American Ceramic Society since 1922. Most of his ceramic work was with cast-iron enamels, in which his achievements were noteworthy. His honest and straightforward character as well as his pleasant personality made fast friends of all of his business associates.

L. George Wassman

He is survived by his widow, Martha; one brother, John, who is now living in Sweden; and one brother, Thure, of Seattle, Wash.

NOTES FOR CERAMISTS

CANADIAN CERAMIC SOCIETY

The Canadian Ceramic Society held a dinner meeting February 16, 1943, at the Engineers' Club, Toronto, Ontario, Canada. William C. McGolpin, National Fireproofing Co. of Canada, Ltd., Toronto, was in charge of arrangements.

The following program was presented:

(1) A demonstration of products and a film showing the manufacture of glass fibers by R. RICHARDSON, Research Labs., Fiberglas Canada, Ltd., Oshawa, Ontario.

(2) A colored film showing the manufacture of brick at the plant of the Dominion Fire Brick and Clay Products, Ltd., Claybank, Saskatchewan.

JOHN L. MASON INVENTED GLASS FRUIT JAR

The first patent covering the Mason fruit jar was issued November 30, 1858 (U. S. Pat. 22,186). It was granted to John L. Mason of New York, N. Y. This patent states that previous patents had been issued to Mr. Mason.

An improvement on the aforementioned patent was issued to Mr. Mason (U. S. Pat. 137,461) on April 1, 1873. By this time, he had moved to New Brunswick, N. J., and was probably associated with the Consolidated Fruit Jar Manufacturing Company.

The old Mason P.L. cap was evidently invented by Lewis R. Boyd; in fact, the Mason cap is still embossed with the name of Boyd and was long known as the Boyd cap. Mr. Boyd obtained a patent March 30, 1869 (U. S. Pat. 88,439). On October 25, 1881, Reissued Letters Pat. 9,909 came out to the original U. S. Pat. 88,439, to the Consolidated Fruit Jar Manufacturing Company, assignee of Lewis R. Boyd, deceased.

A. W. WISHART REPLACES DR. MOREY AT CORNING'S PARKERSBURG PLANT

The Corning Glass Works has announced the appointment of Arthur W. Wishart as general manager of the Company's plant at Parkersburg, W. Va. Dr. Wishart succeeds George W. Morey, who was granted a leave of absence from the Geophysical Laboratory of the Carnegie Institution of Washington, Washington, D. C., to start production at the Corning plant. Dr. Morey has returned to Washington to take charge of a research problem under the auspices of the National Defense Research Committee.

Dr. Wishart received the B.Ch. and Ph.D. degrees from the University of Minnesota, where he studied in the fields of physics and physical chemistry. He joined the Research Division of the Corning Glass Works in 1940 and was later attached to the Optical Glass Department and to the staff of the Chief of Glass Technology. Since the opening of Corning's Parkersburg plant and until his new assignment as general manager, he has served as technical director under Dr. Morey and has been active in developing the plant's technical facilities and staff.

THE BAUXITE SITUATION

Pointing out that the supply of native high-grade bauxite for aluminum in the United States is limited, R. S. Dean, assistant director of the U. S. Bureau of Mines, reported to the annual meeting of the American Institute of Mining and Metallurgical Engineers held February 14–18, 1943, in New York, N. Y., that the Bureau has formulated a master plan whereby sufficient amounts of this vital war metal can be obtained through the utilization of domestic clays, alunite, second-grade bauxite, and other alumina-bearing materials.

Speaking before the Nonferrous Metallurgy group of the A.I.M.M.E., Dr. Dean explained that the Bureau's program resulted from pilot plant and laboratory research by its chemists and engineers and from the finding of additional millions of tons of available raw materials by mining engineers of the Bureau. The plan involves questions of major policy with respect to the allocation of construction materials, priorities, and logistics which are within the jurisdiction of other war agencies.

The Bureau of Mines program has six principal phases:

(1) The further exploration of domestic bauxite to find increased reserves of Bayer-grade (first-grade) bauxite needed for existing plants now capable of using only Bayer-grade bauxite in producing alumina to supply Bayer-grade bauxite for Canadian plants and to provide more high-grade bauxite for use in abrasives in America's war plants.

(2) A four-fold increase in the Bureau's exploration for second-grade bauxite for use in Bayer plants now being converted to use this second-grade material. This should keep reserves virtually constant.

(3) The construction of a plant to mill several millions of tons of high-silica bauxite and produce 1800 tons of first-grade bauxite concentrate daily to supply existing Bayer plants until they can be converted. Such a milling plant could be constructed in three months, would be located in an area which has abundant reserves of high-silica bauxite, and would utilize idle milling equipment.

(4) The construction of commercial plants for the production of alumina from domestic clays.

(5) The erection of commercial plants for extracting alumina from alunite.

(6) Continued research in metallurgical and milling problems to assist the entire aluminum industry.

High-grade bauxite, much of which is imported, is the principal source of alumina (for aluminum) in the United States. Ths supply of high-grade bauxite in the United States is limited. How limited cannot be stated, but there is a very definite limit to the length of time the high-grade bauxite resources will last at the present rate of exploitation unless they are supplemented, even though exploration projects of the Bureau of Mines have considerably increased the figure on reserves.

It is worse than precarious to depend on water-borne imports, so low-grade bauxite which is high in silica or iron, alunites, and the limitless resources of clays, halloysite, etc., must be utilized.

The Bureau of Mines has reported to Secretary of the Interior Harold L. Ickes that the conversion of Bayer plants may take a year, whereas if the Bureau's milling plan were adopted, dependence upon imports would be lessened within three months' time, the United States would have a continuing source of high-grade bauxite concentrates for abrasives, chemicals, and for shipments to Canada, and this nation's aluminum-producing plants would be able to reach capacity production much sooner.

In urging the utilization of alunite and clays, the Bureau has pointed out that even with intensive exploratory work for new bauxite, a milling program, and the conversion of Bayer plants, the United States still cannot produce sufficient alumina to place it in a secure position for a long war. The WPB recently received a detailed proposal based in part on Bureau research suggesting the construction of a plant to produce alumina from the Hobart Butte clay deposits in Oregon. The Bureau has urged that the ammonium sulfate process be used in treating the Hobart Butte ore. The Bureau meanwhile is continuing its studies of clay deposits of the nation and is ascertaining their availability and suitability for the production of alumina by various processes. Suggestions for other plants and other processes for known clay deposits are being formulated.

Exploratory work of the Bureau revealed the availability of millions of tons of alunite near Marysvale, Utah. The Bureau of Mines supported the proposal for the construction of a plant to produce alumina from these reserves by using the kalunite process and such a plant now is nearing completion. The WPB now has under consideration a proposal that another plant at Marysvale, Utah, be revamped to recover alumina from alunite by another process which also has been tested thoroughly in the Bureau's laboratories.

Notable results have been obtained in beneficiating low-grade domestic ores to obtain alunite. As no single process, however, is suited to all domestic sources, the various processes and variations are being investigated simultaneously by the Bureau of Mines in its pilot plants.

FORTY-FIFTH ANNUAL MEETING, AMERICAN CERAMIC SOCIETY, INC.

April 18, 19, 20, and 21, Hotel William Penn, Pittsburgh, Pa.—Seven Divisions Meeting Simultaneously

A War Congress—What Ceramists Are Doing and Should Do

BORAX
& BORIC ACID
99½–100% PURE
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CONSTANT EFFORTS to Develop and to Promote Are Success Essentials

BETTER BUSINESS Conditions Should Not Affect These Efforts. It Is Downright Easy—Too Easy—to Let Down When Sales Just Fall into Your Lap.

BETTER WARE and New Products Are Hurdles Between Where You Are and Where You Must Go If You Are to Keep in the Race for Industrial Competency.

STUDENT MEMBERSHIP IN THE AMERICAN CERAMIC SOCIETY

$5 while in school and for one year after leaving school

SOUTHEASTERN ARTS ASSOCIATION

The annual meeting of the Southeastern Arts Association, which was to have been held in Athens, Ga., March 4, 5, and 6, has been canceled for the duration by vote of the executive council because of wartime difficulties in travel and hotel accommodations. Officers and council members elected at the last meeting will continue in office until such time as it is again feasible to hold the annual meeting.

—KENNETH E. SMITH, *President*

John H. McKelvey

CHANGES AT LACLEDE-CHRISTY

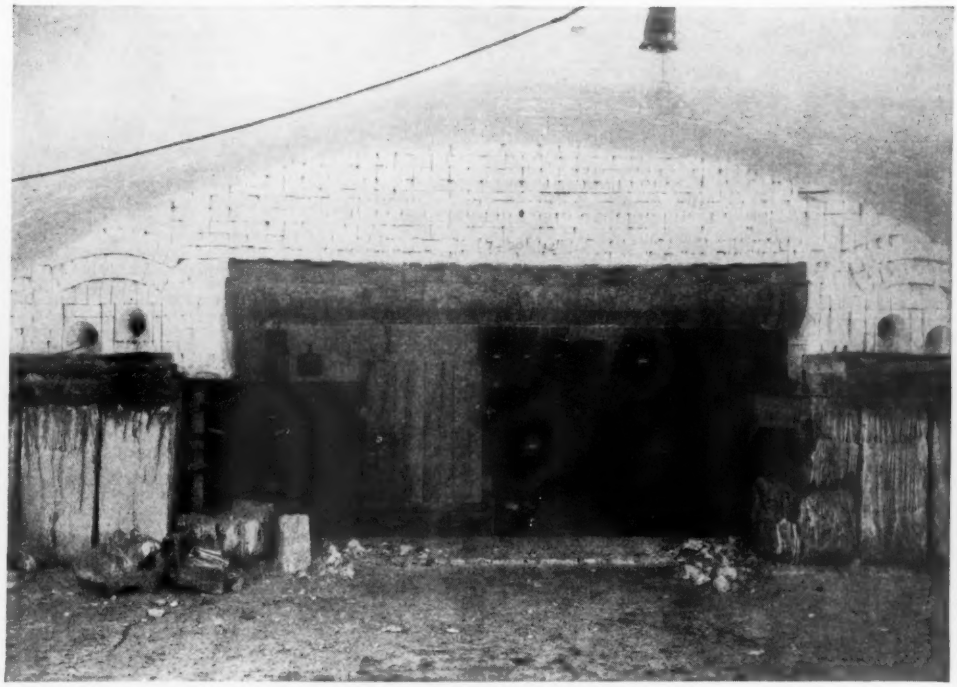
Several organization changes have been made at the Laclede-Christy Clay Products Co., St. Louis, Mo., following the death of John H. McKelvey, December 16, 1943.*

Mr. McKelvey's assistant, John W. Rogers, has been appointed sales manager of the Glass Refractories Division, in which Division he has been employed since February, 1926. He had wide experience in the glass manufacturing industry, including engineering, manufacturing, and construction, before devoting his energies to the refractories problems of glass manufacturing.

All sales divisions of the Company are under the direction of A. H. Killinger, vice-president.

* See *Bull. Amer. Ceram. Soc.*, **22** [1] 26 (1943) for a notice of Mr. McKelvey's death.

POSTWAR DEFENSE FOR CERAMISTS
IS THE
AMERICAN CERAMIC SOCIETY



There's Not Another Like It

NOWHERE else has any engineering organization duplicated this very unique suspended backwall.

It has been in continuous operation for five years on a cross-fire tank furnace pulled on an average of one ton of glass for each 8 square feet of melting area.

NOR is there another combination "just as good" as the Simplex suspended backwall and batch charger.

Let us tell you more about these excellent designs.

FRAZIER-SIMPLEX, INC.

ENGINEERS

436 EAST BEAU STREET • WASHINGTON, PENNA., U.S.A.

Abrasives
Carborundum Co. (*Carborundum and Aloxite*)
Electro Refractories & Alloys Corp.
Felker Mfg. Co.
The Hommel, O., Co., Inc.
Norton Co. (*Alundum-Crystolon*)

Abrasive Wheels: (Diamond impregnated for cutting off brittle materials
Felker Mfg. Co.

Air Conditioning Systems
Frazier-Simplex, Inc.

Aloxite (Refractory Products)
Carborundum Co.

Alumina (Hydrate and Calcined)
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc. Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Pennsylvania Salt Mfg. Co.
The Vitro Mfg. Co.

Alumina (Fused) Brick and Tile
Electro Refractories & Alloys Corp.
The Vitro Mfg. Co.

Aluminum Oxide (Calcine)
The Hommel, O., Co., Inc.
The Vitro Mfg. Co.

Aluminum Oxide (Fused)
Carborundum Co.
Electro Refractories & Alloys Corp.
Foote Mineral Co.
Harshaw Chemical Co.
Norton Co.
The Vitro Mfg. Co.

Alundum (Refractory Products)
Norton Co.

Ammonium Bicarbonate
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Solvay Sales Corp.

Ammonium Bifluoride
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
The Vitro Mfg. Co.

Ammonium Carbonate
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
The Vitro Mfg. Co.

Antimony Oxide
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
The Vitro Mfg. Co.

Antimony Sulphide
Foote Mineral Co.
The Hommel, O., Co., Inc.

Arches (Interlocking, Suspending, and Circular)
Frazier-Simplex, Inc.

Arsenic
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

Automatic Brick Car Loaders
Lancaster Iron Works, Inc.

Ball Mills
The Hommel, O., Co., Inc.
McDanel Refractory Porcelain Co.
The Vitro Mfg. Co.

Ball Mills (Laboratory Type)
Denver Fire Clay Co.
Drakenfeld, B. F., & Co.
The Hommel, O., Co., Inc.
The Vitro Mfg. Co.

Barium Carbonate
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Foote Mineral Co.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
The Vitro Mfg. Co.

Basic Oxides
Porcelain Enamel and Mfg. Co.

Batch Systems
Frazier-Simplex, Inc.
Lancaster Iron Works, Inc.
National Engineering Co.

Batts
Carborundum Co. (*"Carbofrax Aloxite"*)
Denver Fire Clay Co.
Electro Refractories & Alloys Corp.
Norton Co. (*Alundum-Crystolon*)

Beryl
Foote Mineral Co.

Bichromate of Soda
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

Bitstone
Potters Supply Co.

Blades: (Diamond impregnated for cutting glass, tile, quartz, ceramics, Vitreous Products)
Felker Mfg. Co.

Blocks (Refractory)
Carborundum Co.
Corhart Refractories Co.
Denver Fire Clay Co.
Electro Refractories & Alloys Corp.
Louthan Mfg. Co.
Norton Co.
The Vitro Mfg. Co.

Body Stains
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
The Hommel, O., Co., Inc.

Bone Ash
Denver Fire Clay Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

Borax
American Potash & Chemical Corp.
Denver Fire Clay Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co. Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Pacific Coast Borax Co.
Stauffer Chemical Co.
The Vitro Mfg. Co.

Borax Glass
Denver Fire Clay Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Pacific Coast Borax Co.
Stauffer Chemical Co.
The Vitro Mfg. Co.

Boric Acid (Anhydrous)
Denver Fire Clay Co.
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Pacific Coast Borax Co.
Stauffer Chemical Co.
The Vitro Mfg. Co.

Boric Acid (Crystal, Granular, or Powder)
American Potash & Chemical Corp.
Denver Fire Clay Co.
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Pacific Coast Borax Co.
Stauffer Chemical Co.
The Vitro Mfg. Co.

Boron Carbide
Norton Co.

Brick Machines (also Barrows, Molds)
Lancaster Iron Works, Inc.

Brick (Refractory)
L. H. Butcher Co.
Carborundum Co. (*"Carbofrax Aloxite"*)
Corhart Refractories Co.
Denver Fire Clay Co.
Electro Refractories & Alloys Corp.
Norton Co.
The Vitro Mfg. Co.

Cadmium Sulphide
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

Carbofrax (Refractory Products)
Carborundum Co.

Carbonates (Barium, Lead)
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Foote Mineral Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
The Vitro Mfg. Co.

Castings
Lancaster Iron Works, Inc.

Caustic Potash
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Solvay Sales Corp.

Caustic Soda
Denver Fire Clay Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Pennsylvania Salt Mfg. Co.
Solvay Sales Corp.
Stauffer Chemical Co.
The Vitro Mfg. Co.

Cements
Carborundum Co.
Corhart Refractories Co.
Electro Refractories & Alloys Corp.
Norton Co.
Pennsylvania Salt Mfg. Co.

Ceramic Chemicals
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Metal & Thermit Corp.
Pennsylvania Salt Mfg. Co.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Cerium Oxide
Drakenfeld, B. F., & Co.
Foote Mineral Co.

Chromite (Natural Chromate of Iron)
Foote Mineral Co.

Chromium Oxide
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Clay (Ball)
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Kentucky Clay Mining Co.
Maxson, Elwyn L.
Potters Supply Co.
Spinks, H. C., Clay Co.
The Vitro Mfg. Co.

Clay (Bentonite)
Foote Mineral Co.

Clay (Block)
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.

Clay (China)
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Maxson, Elwyn L.
Thomas Alabama Kaolin Co.
The Vitro Mfg. Co.

Clay—Cleaners, Feeders
Lancaster Iron Works, Inc.

Clay (Electrical, Porcelain)
Hammill & Gillespie, Inc.
The Hommel, O., Co., Inc.
Kentucky Clay Mining Co.
Maxson, Elwyn L.
Spinks, H. C., Clay Co.
Thomas Alabama Kaolin Co.

Clay (Enamel)
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Kentucky Clay Mining Co.
Maxson, Elwyn L.
Metal & Thermit Corp.
Porcelain Enamel and Mfg. Co.
Spinks, H. C., Clay Co.
Thomas Alabama Kaolin Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Clay (Fire)
Denver Fire Clay Co.
Great Lakes Foundry Sand Co.
Maxson, Elwyn L.
Potters Supply Co.
Thomas Alabama Kaolin Co.

Clay (German Vallendar)
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemical Dept.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

Forty-Fifth Annual Meeting—War Congress American Ceramic Society

April 18–22, 1943

HOTEL WILLIAM PENN — Headquarters

LOCAL COMMITTEE PERSONNEL

E. Ward Tillotson, *Honorary Chairman*, Mellon Institute
Edward E. Marbaker, *General Chairman*, Mellon Institute
A. Paul Thompson, *Vice-General Chairman*, Mellon Institute

EXECUTIVE COMMITTEE

H. E. Simpson, *Mellon Institute*, Pittsburgh, Pa.
F. C. Flint, *Hazel-Atlas Glass Co.*, Washington, Pa.
John W. Jordan, *Mellon Institute*
W. K. McAfee, *Universal Sanitary Mfg. Co.*, New Castle, Pa.
R. N. Palmer, *Mellon Institute*

GENERAL ENTERTAINMENT PROGRAM

Ernest M. Hommel, O. Hommel Co., Pittsburgh, Pa., *Chairman*

Sunday Evening, April 18
Reception, Music, Refreshments
Talk "Glass After the War" by Dr. Alexander Silverman, University of Pittsburgh

Monday Evening, April 19
Edward Orton Jr. Fellow Lecture, Dr. Norman L. Bowen
Informal Reception Dance

Tuesday Evening, April 20
Evening of Magic presented by Paul Fleming

LADIES' ENTERTAINMENT

Mrs. W. Keith McAfee, 235 Hazelcroft Ave., New Castle, Pa., *Chairman*
Assisted by Mrs. Joseph F. Keaney, Mrs. Ernest M. Hommel, and Mrs. E. E. Marbaker

Sunday Evening, April 18
Reception, Music, Refreshments
Talk, "Glass After the War" by Dr. Alexander Silverman, University of Pittsburgh

Monday Evening, April 19
Informal Dance

Tuesday Afternoon, April 20
Tour of Pittsburgh Stores
Fashion Show

Tuesday Evening, April 20
"Evening of Magic" presented by Paul Fleming

ART ACTIVITIES

C. Fred Sauereisen, Sharpsburg, Pa., *Chairman*

CAMERA CLUB—VICTOR H. REMINGTON, Washington, Pa.

Kentucky Clay Mining Co.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Clay (Micronized)
Porcelain Enamel and Mfg. Co.

Clay Miners
Great Lakes Foundry Sand Co.
Maxson, Elwyn L.
Spinks, H. C., Clay Co.
Thomas Alabama Kaolin Co.

Clay (Potters)
Denver Fire Clay Co.
Hammill & Gillespie, Inc.
The Hommel, O., Co., Inc.
Kentucky Clay Mining Co.
Maxson, Elwyn L.
Spinks, H. C., Clay Co.
Thomas Alabama Kaolin Co.

Clay (Process Equipment)
Lancaster Iron Works, Inc.
National Engineering Co.

Clay (Sagger)
Great Lakes Foundry Sand Co.
The Hommel, O., Co., Inc.
Kentucky Clay Mining Co.
Maxson, Elwyn L.
Potters Supply Co.
Spinks, H. C., Clay Co.
Thomas Alabama Kaolin Co.

Clay-Slip (Albany)
Hammill & Gillespie, Inc.

Clay (Wad)
Kentucky Clay Mining Co.
Potters Supply Co.
Spinks, H. C., Clay Co.
Thomas Alabama Kaolin Co.

Clay (Wall Tile)
Hammill & Gillespie, Inc.
Kentucky Clay Mining Co.
Maxson, Elwyn L.
Spinks, H. C., Clay Co.
Thomas Alabama Kaolin Co

Cleaners
Pennsylvania Salt Mfg. Co.
Porcelain Enamel and Mfg. Co

Cleaners, Chemical
Harshaw Chemical Co.
Pennsylvania Salt Mfg. Co.

Clocks (Gauge Board)
The Hommel, O., Co., Inc.

Cobalt Oxide
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Cobalt Sulphate
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

Colors
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Cone Plaques
Industrial Ceramic Products, Inc.

Cones
The Edward Orton, Jr., Ceramic Foundation

Conveying Equipment
Frazier-Simplex, Inc.
Lancaster Iron Works, Inc.
National Engineering Co.

Copper Oxide
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

Corhart
Corhart Refractories Co.

Cornwall Stone (Imported)
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Maxson, Elwyn L.

Crucibles (Filter, Melting, Ignition)
Carborundum Co.
Denver Fire Clay Co.
Norton Co.
Potters Supply Co.

Crushers (Clay)
Lancaster Iron Works, Inc.

Cryolite (see Kryolith)
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Pennsylvania Salt Mfg. Co.
The Vitro Mfg. Co.

Crystolon (Refractory Products)
Norton Co.

Cullet, Washing Plants, Incinerators, Crushers
Frazier-Simplex, Inc.

Cutters (Bar)
Industrial Ceramic Products, Inc.

Cutters: (Diamond impregnated wheel type).
Felker Mfg. Co.

Decorating Supplies
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
The Vitro Mfg. Co.

Disintegrators
Lancaster Iron Works, Inc.
National Engineering Co.

Dryer (Pipe Rack)
Lancaster Iron Works, Inc.

Drying Machinery
Frazier-Simplex, Inc.
Lancaster Iron Works, Inc.
Proctor & Schwartz, Inc.

Electrocast Refractories
Corhart Refractories Co.

Enamelers' Borax
Porcelain Enamel and Mfg. Co.

Enameling Equipment (Complete)
Frazier-Simplex, Inc.
The Hommel, O., Co., Inc.
The Vitro Mfg. Co.

Enameling Furnaces
Carborundum Co.
The Hommel, O., Co., Inc.
Lancaster Iron Works, Inc.
Norton Co.

Enameling Iron (Sheet)
American Rolling Mill Co.

Enameling Muffles
Carborundum Co. (*Carbofrax*)
Frazier-Simplex, Inc.
Norton Co. (*Alundum*)

Enameling (Practical Service)
The Hommel, O., Co., Inc.
Metal & Thermit Corp.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Enamels
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Enamel Oxide
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.

Enamels (Porcelain)
The Hommel, O., Co., Inc.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Equipment (Porcelain Enameling)
The Hommel, O., Co., Inc.

Feldspar
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Maxson, Elwyn L.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Filter Fabrics
Metakloth Company

Fire Brick
Carborundum Co.
Corhart Refractories Co.
Denver Fire Clay Co.
Electro Refractories & Alloys Corp.
Norton Co.

Fire Brick—Process Equipment
Lancaster Iron Works, Inc.

Fire Clay
Denver Fire Clay Co.
Great Lakes Foundry Sand Co.
Spinks, H. C., Clay Co.
Thomas Alabama Kaolin Co.

Firing Control System
Forester Firing System

Flint
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Great Lakes Foundry Sand Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Maxson, Elwyn L.
Porcelain Enamel and Mfg. Co.

Flint Pebbles
The Hommel, O., Co., Inc.
The Vitro Mfg. Co.

Floors (Non-Slip)
Norton Co.

Fluorspar
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

French Flint
Maxson, Elwyn L.

Frit
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Frosting Mixtures
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

Fuel Oil Systems and Control, Stokers
Frazier-Simplex, Inc.

Furnaces
Carborundum Co. (*Carboradiant*)
Denver Fire Clay Co.
Frazier-Simplex, Inc.
The Hommel, O., Co., Inc.
Swindell-Dressler Corp.

Furnaces, Enameling
Swindell-Dressler Corp.

Glass Bending Ovens, Glass Decorating Machines
Frazier-Simplex, Inc.

Glass Equipment
Lancaster Iron Works, Inc.

Glass Melting Tanks and Furnaces
Frazier-Simplex, Inc.

Glass Sand
Great Lakes Foundry Sand Co.

Glass Thickness Gauge
Bausch & Lomb Optical Co.

Glaze and Body Spar
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Maxson, Elwyn L.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Glazes and Enamels
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

Glaze Spar
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Maxson, Elwyn L.

Goggles
The Hommel, O., Co., Inc.

Gold
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
The Vitro Mfg. Co.

Gold Decorations
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
The Hommel, O., Co., Inc.

Granulators
Lancaster Iron Works, Inc.

All Types of Circular and Straight Tunnel Kilns

SWINDELL-DRESSLER CORPORATION

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Lehrs and Enameling Furnaces, Electric and Gas Fired

Full Details Furnished on Request

POSTWAR SECURITY IS ESSENTIAL

There Must Be No Slacking in Ceramic Research and Education

FORTY-FIFTH ANNUAL MEETING

CERAMIC WAR CONGRESS

AMERICAN CERAMIC SOCIETY with seven simultaneous Division meetings.

Week of April 18, 1943, Hotel William Penn, Pittsburgh, Pa.

EMERSON P. POSTE

CONSULTING CHEMICAL ENGINEER

ANALYSES: CERAMIC RAW MATERIALS AND PRODUCTS, FUELS, IRON AND STEEL, ETC.

SPECIAL INVESTIGATIONS: PHYSICAL AND CHEMICAL TESTS ON ENAMEL ETC.

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CHATTANOOGA, TENN

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WE HAVE FULLY EQUIPPED LABORATORIES AT

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The Best West of the Rockies

- **POTTERY CLAYS**
  English and American
- **CERAMIC COLORS**
  Blythe Colour Works, Ltd.
- **SLABS...SETTERS...SAGGERS**
  New Castle Refractories Co.
- **STANDARD PYROMETRIC CONES**
  Edward Orton, Jr., Ceramic Foundation
- **FRANTZ FERROFILTERS**
- **LAKEFIELD NEPHELINE SYENITE**
  Great Lakes Foundry Sand Co.

ELWYN L. MAXSON

Offices & Storeroom 1526 Canada Blvd., Glendale, Calif.

Grinding Wheels
Carborundum Co. (*Carborundum and Aloxite*)
Electro Refractories & Alloys Corp.
Felker Mfg. Co.
Norton Co. (*Alundum-Crystolon*)

Hearths
Carborundum Co. (*Carbofrax* heat treating)
Corhart Refractories Co.
Norton Co. (*Crystolon*)

Hearths (High Aluminous Clay, Electrically Sintered Aluminum Oxide, Silicon Carbide)
Carborundum Co.
Norton Co.

Hydrofluoric Acid
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

Iron Chromite
Harshaw Chemical Co.

Iron (Enameling)
American Rolling Mill Co.

Iron Oxide
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Foote Mineral Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Porcelain Enamel and Mfg. Co.
The Vitro Mfg. Co.

Kaolin
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Maxson, Elwyn L.
Thomas Alabama Kaolin Co.
The Vitro Mfg. Co.

Kilns, China (Decorating)
Denver Fire Clay Co.
Drakenfeld, B. F., & Co.
Frazier-Simplex, Inc.
The Hommel, O., Co., Inc.
Swindell-Dressler Corp.

Kilns (Electric, Circular, Tunnel)
Swindell-Dressler Corp.

Kiln Furniture (Silicon Carbide, Semi-Silicon Carbide) (Refractory)
Carborundum Co.
Electro Refractories & Alloys Corp.
Louthan Mfg. Co.

Kryolith (see Cryolite)
Pennsylvania Salt Mfg. Co.

Laboratory Ware
Norton Co.

Lehr Tile (High Aluminous Clay, Electrically Sintered Aluminum Oxide, Silicon Carbide)
Carborundum Co.
Electro Refractories & Alloys Corp.

Lehrs
Frazier-Simplex, Inc.
Swindell-Dressler Corp.

Lehrs (Electric or Fuel Heated)
Frazier-Simplex, Inc.
Swindell-Dressler Corp.

Lehr Loaders
Frazier-Simplex, Inc.

Linings (Furnace Refractory, Block Refractory Plate, Brick, and Tile)
Carborundum Co.
Corhart Refractories Co.
Denver Fire Clay Co.
Electro Refractories & Alloys Corp.
Norton Co.
The Vitro Mfg. Co.

Lithium Carbonate
Drakenfeld, B. F., & Co.
Foote Mineral Co.

Lithium Minerals
Foote Mineral Co.

Loaders (Bucket)
National Engineering Co.

Magnesia (Fused)
Electro Refractories & Alloys Corp.
Norton Co.

Magnesia (Sintered, Calcined)
Drakenfeld, B. F., & Co.
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Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Porcelain Enamel and Mfg. Co.

Magnesite
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Foote Mineral Co.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
The Vitro Mfg. Co.

Magnesite Calcined
Foote Mineral Co.
The Hommel, O., Co., Inc.

Magnesium Carbonate
Drakenfeld, B. F., & Co.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

Manganese
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
The Vitro Mfg. Co.

Manganese Dioxide
Drakenfeld, B. F., & Co.
Foote Mineral Co.

Manganese (Oxide)
Corhart Refractories Co.
Drakenfeld, B. F., & Co.
Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.

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Hammill & Gillespie, Inc.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
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The Hommel, O., Co., Inc.
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Nitre
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The Hommel, O., Co., Inc.

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Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.

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Du Pont de Nemours, E. I., & Co., Inc., Electrochemicals Dept.
Harshaw Chemical Co.
The Hommel, O., Co., Inc.
Metal & Thermit Corp.
Porcelain Enamel and Mfg. Co.
Titanium Alloy & Mfg. Co.
The Vitro Mfg. Co.

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The Hommel, O., Co., Inc.

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